

MODERN IDEAL HOMES FOR INDIA

By

R. S. DESHPANDE,

B. E., B. S. E., M. I. E. (IND.)

ENGINEER, BOMBAY P.W.D. (RETD.), MEMBER OF THE NATIONAL PLANNING COMMITTEE; AUTHOR OF : " CHEAP AND HEALTHY HOMES FOR THE MIDDLE CLASSES "; " BUILD YOUR OWN HOME "; " MATERIALS OF CONSTRUCTION "; " SULABHA VASTU SHASTRA "; " DISPOSAL OF DOMESTIC SEWAGE "; JOINT AUTHOR OF " A TREATISE ON BUILDING CONSTRUCTION "; " A TEXT-BOOK OF REINFORCED CONCRETE DESIGN "; " A TEXT-BOOK OF SANITARY ENGINEERING "; " WATER SUPPLY ENGINEERING "; " A TEXT-BOOK OF RAILWAY ENGINEERING "; " A TEXT-BOOK OF SURVEYING AND LEVELLING "; ENGINEERING MATERIALS FOR DIPLOMA STUDENTS "; ETC.

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FOREWORD

By SIR M. VISVESVARAYA, KT., K. C. I. E.

HOUSING is one of the three or four prime necessities of life and house building is the oldest of Indian arts. As changes are taking place in the habits and standards of living of our people and new structural materials are coming into use, an up-to date book on house design and house planning comes as a timely addition to our scanty technical information in this country.

The book gives a large variety of plans and views to suit all tastes and purses. The author, Mr. R. S. Deshpande, had, before writing it, equipped himself for the task, first by extensive practice in building Indian homes, and later, by travelling in Western countries and Japan to study modern house-building technique in those countries.

The book should prove a welcome guide both to persons anxious to secure comfortable and attractive homes at moderate cost, as well as to contractors, co-operative societies and other agencies interested in house-building projects on a large scale.



CONTENTS

CHAPTER	PAGE
INTRODUCTION	1
1. ROUGH COST	6
2. ECONOMY	9
3. SELECTION OF SITE	15
4. ORIENTATION	18
5. THE PLAN	21
PRINCIPLES UNDERLYING THE PLANNING OF A HOME :	
(1) Aspect	
(2) Privacy	
(3) Prospect	
(4) Grouping	
(5) Roominess	
(6) Furniture Requirements	
(7) Sanitation	
(8) Flexibility	
(9) Circulation	
(10) Practical Considerations	
6. ANALYSIS OF A "HOME"	33
ALLOTMENT OF DEFINITE SPACE FOR HOME ACTIVITIES :	
(1) Cooking	
(2) Dining	
(3) Rest and Relaxation	
(4) Sleeping	
(5) Study	
(6) Child-play	
(7) Storage	
(8) Concentration	
(9) Recreation	
(10) Toileting	
(11) Reception	
(12) Drying Clothes	
(13) Entrance and Exit	
7. GROUPING OR SYNTHESIS OF A "HOME"	37
APPROPRIATE PLACEMENT OF APPURTENANCES :	
(1) Verandah	
(2) Drawing-room	
(3) Bed-rooms	
(4) Dressing-room	

CHAPTER	PAGE
(5) Kitchen	
(6) Dining-room	
(7) Ladies' Apartment	
(8) Store-room	
(9) Prayer-room	
(10) Bath-room	
(11) Staircase	
(12) Comfort-room	
(13) Guest-room	
(14) Nursery or Children's Room	
(15) Latrine	
(16) Motor Garage	
8. "MODERN" ARCHITECTURE	66
PRINCIPLES OF TRUTH AND HONESTY, PROPORTION, BALANCE AND HARMONY.	
9. LANDSCAPE GARDENING	74
10. INTERIOR DECORATION AND COLOUR SCHEMES ..	83
RELATION BETWEEN DIFFERENT COLOURS, HARMONY, DISCORD AND CONTRAST IN COLOURS, COLOUR CHART, COLOUR SCHEMES.	
11. FURNITURE AND FURNISHING	96
OBJECT OF FURNISHING, PRINCIPLES OF DESIGN, COLOUR, ETC. COMMON FURNITURE USED IN DIFFERENT ROOMS, PLANTS IN ROOMS.	
12. INSULATION OR HEAT-PROOFING	102
PRINCIPLES AND DIFFERENT UP-TO-DATE METHODS ADOPTED.	
13. AIR-CONDITIONING	107
PRINCIPLES AND METHODS.	
14. SOUND-PROOFING FOR PRIVACY	114
15. ARTIFICIAL LIGHTING	116
16. SPECIFICATIONS OF AN IDEAL HOME	120
17. INTRODUCTION TO PLANS	121
18. Low Cost Houses (Plans 1 to 8) costing less than Rs. 5,000 ..	123
19. Economical Cottage Homes (Plans 9 to 26) costing from Rs. 7,500 to 18,000	134
20. Economical Cottage Homes (Plans 27 to 35) costing from Rs. 18,000 to 30,000	168
21. Economical Cottage Homes (Plans 36 to 48) costing from Rs. 30,000 to 40,000	186
22. Storeyed Cottages (Plans 49 to 74) costing from Rs. 25,000 to 40,000 and more	212
23. Row Buildings (Plans 75 to 81)	264
24. Flats from 2-room tenements to 6-room luxury flats (Plans 82 to 96)	273
25. Index.	296

Introduction

A *HOUSE* is a shelter consisting of walls, floors, doors, windows, roof etc. in which human beings live. A *HOME* is a house, in which you and your family enjoy all the happiness, affection and love of each other, health, ease and comfort, *plus* entertainment, social activities and indulgence of hobbies.

Your house will probably be the largest single investment you will make in your life. Therefore most careful attention should be given to all the aspects of designing and construction in details involved in such an important undertaking.

The most important part in building a house is the time spent in thinking about it before you go to an architect for consultation. For, you alone know what is the best for your family.

While thinking you must use two things: your common sense and open mind. Do not retain old ideas of home planning until you have thoroughly examined them in the light of the present-day living. Do not condemn modern architecture until you understand what it is trying to accomplish. The following pages describe some of the new ideas to assist you in deciding what is best for your family.

Every one has his personal ideas about a house, which are based on the past traditional style of living. The modern school of architecture started at the beginning of this century, and has become associated in the mind of the lay public, with overhanging *chajjahs* and canopies, flat roofs, and architectural freaks published in magazines. But the development of this modern school is still in its infancy, although the better class of architects have passed the "modernistic" stage of its evolution.

Our ways of life have changed in this "jet and space" age. The modern home must be designed to suit the personal life and habits of a modern family, without being influenced by traditional features, which are still lurking in the minds of people, though they have lost their propriety with today's changing life.

Slowly but surely, the average person is being accustomed to many new forms, such as large windows, which establish connection between outdoors and indoors by bringing more light into the house. The freedom of modern planning allows an unlimited use of form, colour and light, with complete freedom from symmetrical fronts. Space inside a house should

be free around walls, by the use of curtains, folding or removable partitions of low height (7' or 8'), out into the garden.

Unfortunately a good modern house is difficult to design, as even amongst architects, good, modern designers are few and far between. There are too many imitations or copies of modern architects by people who do not understand what they are trying to do. A flat roof does not necessarily make a house modern, nor does a corner window, and so on. Many good modern houses may not pass for being judged as modern by the above criterion because they have neither of these features.

A house is modern, if it is designed to suit the personal habits of your family, if it is flexible in plan, so that its space can be used for varied activities, if it takes full advantage of nature—sun, wind, and views, if it is easy to run and keep clean, and if it is bright and cheerful. You are then sure to enjoy living in it.

As a general rule, if a house fulfils the above principles, you have the essentials of a good design.

Unfortunately, however, since the beginning of the fifties, on account of the steady, progressive rise in the cost of labour and materials, more than four times as before, the conditions have altogether changed. Sites near cities and industrial towns now cost as much as, and frequently even more than the house itself. This means that to reduce the total cost, the house itself must be pared in area, and also in amenities. Consequently, not only the people belonging to the middle class, but, even those of the upper class must now forget the once cherished dream of large, luxurious houses.

Never before in the history of this country the house famine has been so acutely felt as during the past decade. The reasons are many. Firstly, the tendency of the rural population to leave their village homes and flock to the industrial centres in search of jobs, gained a sudden fillip, with the rapid industrialization, during the last decade, causing overcrowding in the already crowded cities and towns, creating a dearth of houses, both in cities and villages—in cities, because of overcrowding, and in villages, because, the *kacha* houses, which are deserted, crumble and fall to the ground for want of care.

Secondly, the influx of refugees in very large numbers from Pakistan, ever since the partition to date, which spread over the whole country, particularly in towns and cities, has made the problem more difficult.

Thirdly, the Rent Act. In the beginning it was considered to be a blessing by the lower middle classes. But, actually it has done more harm than

good. It has split the community into two more castes or classes—one of the landlords and the other of the tenants, whose interests are antagonistic to each other. It has done great injustice, at least in Maharashtra (so far as I know), to owners of small properties, by prohibiting them from raising rents above what they were prior to 1940, in spite of the facts, that the rates and taxes, and costs of labour and materials for repairs have increased four to five times as much, while the tenants got considerable relief by way of raise in salary and dearness allowance. In many instances, these rents, after paying the taxes do not meet the heavy cost of repairs. To these people a house property has become a liability than an asset as at one time. Not only the repairs are neglected, but some owners are jubilant, if the house collapses. We hear every year of so many large buildings in cities and towns collapsing during rains, and the families living in them rendered homeless.

Fourthly, as the land values have shot up, and the cost of construction risen abnormally high, and as some essential materials like cement and steel are proverbially in short supply, except at black market rates, no one except the few who are favoured by fortune try to build new houses. Some tardy attempts were made by Government by constructing buildings for housing its servants in cities like Bombay, but, their rents were so high that only the high-salaried persons could afford to pay them, and besides, the problem is so vast that the attempt proved to be like a drop in the ocean. Another attempt was made by Government for some time by encouraging co-operative housing societies by advancing loans on joint credit of members. But on account of the high cost of land and construction, the monthly instalments payable to the societies, which included the share of the interest, taxes, repairs, and the insurance were so high that very few people could take advantage of it. Then again this facility also has been suspended temporarily, on account of the emergency caused by the border dispute with China. Recently the Life Insurance Corporation is advancing loans even to individuals to the extent of 90% of the building cost, provided they insure their life to the extent of the amount of loan. The difficulty in this case is still greater than in that of the co-operative societies. For, the rate of interest is 6% instead of 5½%, and in addition to all the items included in the monthly instalment towards repayment, there is that of insurance premia. Naturally the response is meagre.

The result of all this has been that while on the one hand the population of cities is increasing by leaps and bounds, on the other, many of the old houses are crumbling every year, very few new ones are coming up,

and thus the gap between the demand and supply is widening every day.

Recently flats are being built on "ownership basis" and sold by speculative builders in Bombay. The scheme has not been popular anywhere outside Bombay. There the land prices are, at present, of the order of Rs. 175/- to Rs. 225/- per sq. yard, and that too in the suburbs! Hence buildings of less than 7 to 8 storeys are not profitable. The speculative builders take undue advantage of the helplessness of people.

As a house is one of the prime necessities of life, like food and water, people have to submit to it, and even people of small means raise loans and buy these flats, though they may not suit their family living, not to speak their tastes. God alone knows what will become of their ownership in point of law, when disputes arise in respect of sharing the costs of common repairs and renovations.

Leaving aside the special case of Bombay, it is now an established fact that the costs both of construction and site have risen very high, and the trends are still upwards. Further, there is no hope of their coming down substantially in future. This is not peculiar to India, but is common with all the countries in the world. As a general rule, as a country's prosperity increases, the standard of living also increases, and with it the price of every commodity, as has happened in America and the prosperous countries of Europe.

We must, therefore, be content with small, compact houses which must, in future, be so designed as to work efficiently like a ship's cabin. A house must fit the family as clothes do the wearer. This is a prerequisite, and above all, it should not be judged solely on how it looks from the outside. Pretty outside with a bad inside is worthless. Good appearance must automatically follow good design. A slight attempt at pleasant texture, colours, and lines will certainly enhance its appearance. There is also the big problem of servants, which is becoming more acute day by day. A small, compact house is easy to run and keep in a tip-top condition, without much dependence on servants.

Perhaps, the most important single element in the successful design of a small, compact house is the feeling of openness and space and an efficient use of this space. Here are some factors, which achieve this end and also help in reducing the cost:

Minimum Partitions: Island kitchen, open stair well (not enclosed in a staircase room), open dining-cum-living area, sliding doors.

Added Height (Visual): Open ceiling with exposed rafters, low partitions (7' to 8' high), sky-lights.

Minimum Passages or Lobby Space: Grouping of rooms in such a way that a small passage gives independent access to, at least, bed-rooms and sanitary services.

Unbroken Wall Areas: This affords convenient space for furniture and adds to visual length of rooms by providing built-ins and storage walls.

Large Windows: These open up the interior to the outside, giving a feeling of more room by bringing the outside in.

Flexibility and Multi-use of Spaces: Here are some devices which either expand, or, isolate a room for privacy, as the occasion may demand: Sliding doors between rooms, which must at times be private, e.g. bed room/living room; kitchen/dining room, etc. Screens, plants, or furniture are more casual means of separating or enclosing space.

It should be noted that while we are mainly concerned with the problem of adding or opening up space, we should not lose sight of the human need for maintaining intimate or cosy spaces which help give a feeling of security and which we enjoy so much during quiet hours or when we want to be alone.

The above principles are discussed in detail in the notes which follow and are further illustrated amply in the plans and the text notes on them.

This edition is thoroughly revised, keeping the present economic difficulties of the middle classes constantly in mind. Nearly 70% of the plans of large and luxurious houses in the previous edition have been scrapped and replaced by low cost, compact and convenient houses. Even the 30% of the old plans, which are retained, are so selected that with small alterations which are suggested, they, too, can be brought in line with the others.

In this volume, economy in planning, so as not to waste a single square inch of built-up area under the roof is considered. There is, however, another aspect of economy, viz. economy in construction, which is of equal, or perhaps, greater importance. Regarding this the reader is referred to the Author's companion volume to this book, viz. *Build Your Own Home*.*

* *Build Your Own Home* (4th edition, price Rs. 15/-). This book treats the subject in a non-technical, easily understandable language beginning from how much to build, how much to spend, how to raise money, how to keep within the estimate, etc. to foundations, walls, partitions, doors, windows, etc. to roof, finishing, painting, etc.

CHAPTER I

Rough Cost

WHEN the layman has decided upon the length and breadth of the house to suit his requirements, the next question which confronts him is to find the approximate cost and see how it suits his purse. Very often the *maistry*, whose help he seeks, has either got no clear idea about it or, in his attempt to please his prospective client, he intentionally quotes a low figure. And, when the actual construction ultimately costs him double the amount, he blames the *maistry*, but the latter escapes all responsibility saying that the additions and alterations subsequently made by him (the owner) are responsible for the increased cost, and that, therefore, no blame attaches itself to him. Though this may be partially true, it is not wholly so. The owner now realises how he was befooled. In order, therefore, to save oneself from such a calamity, it is absolutely necessary that there should be some rough and ready rule to find out at once what a particular sized house is going to cost, or what size of house one can build within the amount which one can afford to spend. The following rule will serve that purpose very well.

Multiply together the length and breadth (both in ft.) of the proposed building to get the sq. ft. area at the plinth level. Then multiply this area by one of the rates of construction per sq. ft. which would suit the specifications of your proposed building, given below.

Four classes of buildings, according to the specifications are considered below:—

CLASS I:— Thick, load-bearing outer walls of medium dressed stone, or first class brick in cement mortar (1 : 6); 6" to 9" thick partitions of brick in cement mortar (1 : 6) with framework of R.C.C. columns and beams on the inside, or R.C.C. framework also on the outside with thick, outer walls to protect the house from the elements; Doors of teak wood with flush panels in important rooms with chromium-plated, or oxidised brass fittings; and with panels in other rooms; Windows of teak wood fully glazed with oxidised brass fittings; Cement gauged (1 of cement to 12 of lime mortar) or cement plaster to walls on the inside and cement rendering on the outside; Marble mosaic tiled flooring with 6" skirting on sides in all important rooms, front passage and verandah, *tandur* or similar flag-stone polished flooring in kitchen, bath room and w.c. white glazed tile 4'

dado in bath and w.c.; first class staircase of R.C.C. with treads of coloured cement chequered tiles or polished *tandur* slabs, R.C.C. parapet and teak wood polished hand rail; built-in closets in bed rooms; raised *chulla* platform and cabinets in kitchen; storage loft on top of bath room and passage; terraced R.C.C. roof with water-proof surface treatment, overhead water tank; and all other work of first class material and workmanship, exclusive of cost of site, special sanitary fittings such as bath tub and lavatory basins, etc. Ra. 18 to 25 per sq. ft.

CLASS II:— Outer thick walls of random rubble, neatly cement-pointed, or of second class brick work in cement mortar (1 : 6); Partitions on the inside of brick in cement mortar (1 : 6) with frame work of R.C.C. columns and beams; Cement gauged mortar (1 of cement to 16 of lime mortar) for plaster on the inside, and cement gauged mortar (1 of cement to 10 of lime mortar) for outer rendering; Teak wood panelled doors in living and bed rooms, and plane-planked in other rooms; half-glazed and half-panelled teak wood windows with oxidised brass fittings (also to doors); mosaic marble tiled paving in front verandah, and living/dining rooms, and ordinary (not polished) flagstone paving in other rooms, *tandur* polished paving in bath room and w.c.; Indian patent stone (concrete with polished surface) flooring in kitchen, built-in closet in bed-rooms, loft on top of bath room and passage. Staircase (if storeyed) of R.C.C. with ordinary flagstone treads and polished teak hand rail, raised platform for *chulla* in kitchen, all other work strong and durable, but of second class quality. Ra. 15 to 18 per sq. ft.

CLASS III:— Rubble stone, or second class brick in cement or lime walls; Cement pointing on the exposed face, 9" brick partitions in cement mortar (1 : 6); R.C.C. slab floor on top of walls, lime plaster on the inside (except cement plaster in bath room and w.c.), ordinary (not polished) flagstone paving in living/dining room and front verandah, and Indian patent stone flooring in all other rooms including bath room and w.c.; Staircase (if required) of R.C.C. with brick-on-edge parapet plastered on both sides, and rough flagstone treads; Door and window frames of *Sal*, *Nana*, or similar white-ant-resisting country wood (other than teak), panelled shutters in living room, and plane-planked shutters in other rooms; with iron fittings; Roof of R. C. C. slab (not terraced) with good slopes at top to drain rain water, or of asbestos cement sheets on red teak or benteak purlins; Raised *chulla* platform of 2" thick, 2' × 4' flagstone in kitchen; Loft on bath room and passage. Ra. 10 to 13 per sq. ft.

CLASS IV:— Stone or brick in lime masonry up to plinth, above it framed structure of round teak *ballies* concealed in the centre of rubble or brick in mud mortar walls of full thickness both outside and inside, if it is a storeyed structure, otherwise all thick walls in mud, without round teak *ballies* frame if single storeyed. Cement pointing on the exposed face, lime plaster on the inside; Shahabad paving on 1" lime screeding, on rammed muram, cement pointed, for floors of important rooms, Indian patent stone in all other rooms including kitchen and bath room, w.c.; Frames of doors and windows either of R.C.C. or white ant-resisting country wood, shutters one inch thick of teak with panels of asbestos cement; Staircase (if required) of R.C.C. inclined slab, and brick in mud steps with one in. thick flagstone treads; Roof of asbestos cement sheets on red teak or benteak purlins; Country wood loft on top of bath and w.c. and half of kitchen at 7 ft. height; Raised *chulla* platform in kitchen, wall cupboards in bed rooms and kitchen. **Rs. 7 to 10 per sq. ft.**

Limits of maximum and minimum rates are given for every class of specification, since the rates vary very much. To ascertain the correct rate applicable to your particular place, and specifications, ask any experienced local contractor, architect or engineer.

The above constants are applicable to a ground floor structure only. If one more floor is to be raised either on top of the whole building or part of it, deduct one rupee from the ground floor rate in the case of the first two classes, and Rs. 0.75 and Rs. 0.50 in those of the third and fourth classes respectively, and multiply the upper floor area by it. The reason for the slightly lower rate for the upper floor is that there is a saving on foundations, roof, and drainage, which are the same as for the ground floor, against this saving some extra cost is required for a staircase, and hauling all the materials to extra height during construction. Still, on the whole, there is some saving.

It is worth noting here that the bigger the size of the rooms the lower is the incidence of cost; and inversely, the smaller the rooms, greater is the cost. For, if the rooms are small, the number of doors and windows is the same, and the latter is a very costly item on the estimate, than blank walls or the floor. Hence, for reducing the cost, mere reduction in areas of rooms will not help, unless a whole room is omitted.

• • •

CHAPTER II

Economy

WHETHER rich or poor, a man always likes to economize on his house. In fact, it is the social duty incumbent on everyone who wants to build a house, to practise economy wherever it is possible to do so. On the contrary, it is economically criminal not to do so. However, it should never be carried to excess so as to weaken the structure. A strong and solidly-built structure proves to be cheaper in the long run. Only the rich can afford to pay the heavy maintenance charges of cheap and jerry-built structures, which is not possible for ordinary people. Economy must really begin even with very trifling things. A trifle saved on a hundred items goes to make up a big amount. Below are given a few hints on how to practise economy.

(1) The first and foremost suggestion for economy is to get an estimate of the house framed by an expert, in which the thickness and the size of materials to be used is specified. It is a penny-wise-and-pound-foolish policy to grudge paying him his dues, which form a trifling percentage of the total cost. In its absence, if undersized material is used, the owner has sooner or later to pay heavily for it; if however, oversized material is used, it is not detected but is a national waste. By specifying the correct size, the architect would show avenues of saving Rs. 500 or even more, and further, make you care-free.

(2) The more the dimensions of length and breadth of a house approach each other, the less is its cost. In other words, an approximately square building is cheaper than an oblong one. To illustrate this, take the simple case of two houses, one measuring 80 ft. \times 20 ft. and the other 40 ft. \times 40 ft. Supposing the walls of both are of the same thickness (say 18 inches) as also the height of both is the same, viz. 20 ft., and taking only the outer walls, to simplify matters, the masonry of the first house is roughly:

$$\text{Long walls } 2 \times 80 \times 1.5 \times 20 = 4,800$$

$$\text{Short walls } 2 \times 20 \times 1.5 \times 20 = 1,200$$

$$6,000 \text{ c. ft.}$$

and that of the second,

$$4 \times 40 \times 1.5 \times 20 = 4,800 \text{ c. ft.}$$

Thus, the masonry of outer walls only of the first house is 25 per cent more than that of the second.

Moreover, there are certain special advantages in a square house over an oblong one, e.g. a square house is cooler in summer and warmer in winter than an oblong one, because the latter exposes a greater surface to the elements. The roof of the square house looks better and is simple and less costly to construct. Thirdly, a square house, being more compact, the space occupied by corridors, which are necessary for the preservation of the privacy of each room, is much less in a square house than in an oblong one, and so on. All this is true up to a certain limit, beyond which, however, either open central *chowks* (yards) or small verandahs have to be provided for lighting the inner rooms, in which considerable space is lost. Again, beyond a certain limit, the height of the roof of a square house near the centre, and also the length of the hip rafters—and in consequence their section—increase the cost.

From the point of view of the comfort of the inmates of a square house, unless it be a small and compact one, it is not recommended in tropical countries. It may be suitable for hill stations, especially in the winter.

(3) A storeyed building, having half the number of rooms on the ground and half on the first floor, is much cheaper than a bungalow or only a ground-floor structure, because the expense on account of foundations and roof for the storeyed building is nearly half of that for the ground-floor structure. Similarly, the expense for both on account of drainage channels on the ground and gutters below the eaves of the roof is also half. No doubt, the staircase requires some extra amount and scaffolding and hauling up materials for construction to an increased height is more expensive; but the saving caused in foundations and roof is much more than this extra expense.

Again, for a certain amount of accommodation, a ground-floor structure requires a larger plot of land than a storeyed building. Where the site is very costly, this consideration alone outweighs all others. Besides, it is no small gain, particularly in crowded localities, that the rooms on the upper floor get a freer and purer breeze, which is a blessing in summer in a hot country like India.

This principle, however, could be stretched up to a small attic-room, i.e. a low three-storeyed building, beyond which the cost again increases because the foundations and walls of a three or more storeyed building require to be of extra strength, and hence they are more costly.

(4) For the middle-class people, there is no better way of effecting a considerable economy than by restricting the height of floors. Ordinarily, 8 ft. or $8\frac{1}{2}$ ft. height is sufficient and in all the Western countries including U.S.A. 8 ft. height of ceiling is allowed in residential buildings. But, here in India in some houses it is kept 12 to even 14 ft. which is not only unnecessary but wasteful. It is likely to be argued that more height means more

cubic content of air, which is no doubt true, but hygienically it is not the greater cubic content of a room but the means provided for renewing the air by providing *through* ventilation in it, which is of more importance; for this, cross ventilation, i.e. windows in one wall for admitting fresh air and similar ones in the opposite wall for driving out the vitiated air, is required. Unfortunately the by-laws of many municipalities in India insist on a minimum of 10 ft. height of ceiling, which must be amended, in these days of high costs.

Another argument likely to be advanced in favour of greater height of floors is that the building looks bold and prominent, but it should be remembered at the same time that the higher a building, the greater is the weight which its foundations have to bear and the more have its walls to resist the thrust of high winds. It is wrong to suppose that the artistic beauty of a building depends upon its height. It depends on the treatment of the proportions of its exterior parts towards each other, and the grace of its outline.

By reducing the height of floor from 10 ft. to 8 ft., the saving effected in masonry is 25 per cent; there is also a saving in the cost of a shorter staircase and a saving in the effort of climbing it. The latter point is of great importance from the point of view of the aged, infirm, or ailing member in the house.

It is not, however, advisable to try to effect economy by unduly curtailing the height of the plinth. A high plinth contributes to preserve sanitation and health of the family and, hence, as far as possible, it should not be reduced to less than 2 ft. However, 4 or 5 ft. height of plinth, which is oftentimes kept (unless it be in a damp locality or for accommodating a cellar) is a waste, which the middle or lower class people cannot afford.

(5) Another means of reducing the cost of a building is to build the outer walls thick enough to protect the house from the heat of the sun and raids of thieves and to build all the inner ones of half or one brick thickness ($4\frac{1}{2}$ inches or 9 inches) with intermediate posts of wood, steel, or R.C.C. framework to support the weight of the upper floor or floors and roof. It has now been possible to build R. C. C. partitions of any thickness up to a minimum of $1\frac{1}{2}$ inches. It is observed in a good many houses that 15-inch brick walls or many times 18-inch stone walls are built, where half or one brick partition walls could very well have answered the purpose. The main object of a partition wall is to afford privacy; any extra thickness beyond that required for that purpose is, therefore, a waste.* If it is argued that

*For making the partitions sound-proof, please refer to the author's *Sulabha Vastu Shastra or Build Your Own Home*.

thick walls are useful for providing cupboards, they are disproportionately costly. Instead built-in wardrobes in bed-rooms (described later) are more efficient and cheaper.

(6) Local usage should be adopted as far as possible. Maximum advantage should be taken of the material and labour locally available, e.g. if stone walls are insisted upon where stone is scarce and hence bricks are locally used, or if Moulmein teak is insisted upon where good country timber is plentiful and cheap, the work is bound to be costly.

(7) Division of labour and specialization are great points in saving money, particularly when the work is being done departmentally. Masons who are used to dressing, should be employed on dressing only, and those to setting, on setting only. An artisan of high wages should not be required to do the work of an unskilled coolie. This is a very important point which is generally overlooked, e.g. if a mason getting Rs. 6·00 a day is employed on the work of pointing masonry joints, perhaps, he may do even less work than young boys who usually do that work on a daily wage of a rupee or so and who have specialized in it. Another point to be borne in mind is never to allow a highly paid artisan to be handicapped for want of adequate assistance; e.g. for want of an additional woman worker getting Rs. 1 to 1·25 per day, if a mason employed on Rs. 6·00 per day is required to do her work partly, such as mixing mortar, carrying bricks, stones, etc., six rupees are sacrificed to save a rupee. Similarly, a bullock-cart is often engaged on Rs. 8 per day for carrying certain material over a short distance; the cartman has to load and unload it single-handed. During the interval he is doing it, the high-waged cart has to stand still, and it is no wonder if the output is far less in comparison to the amount spent.

(8) A good deal depends upon the season in which the building work is commenced. In winter, the days are short and it is not possible to start the work earlier than 8 A.M. Besides, the progress of the work in the first hour or so is not satisfactory on account of cold. Again, the work has to be closed by 5 P.M. as the workmen have perhaps to wend their long way home before dark; thus with a respite of two hours in the noon, the actual working period amounts to seven hours, whereas if the building work is commenced by about the close of winter, the working period from 7 A.M. to 7 P.M. with the same meal-time respite, is 10 hours. Thus a saving of 28 per cent in the cost of labour or nearly more than 9 per cent of the whole work is effected.

(9) If work is done expeditiously (of course, without undue haste), it is done at a much less cost than if it is allowed to linger on. The overhead charges of establishment are less and the interest on the capital outlay during construction is less. Anticipate all likely difficulties and try to solve them

early in good time. For this, it is desirable to chalk out a programme not only for the whole season, but also a detailed one for every 2 or 3 days in advance, and then try to stick to it.

(10) If doors and windows are kept of one uniform width, the joiners who have to work on uniform sizes find it much easier and finish it more speedily. Again fewer centerings are required for supporting lintels or arches over them. In other words, standardization of sizes and materials is very helpful in reducing costs.

(11) It is usual to rake out joints of masonry and fill them again with lime or cement. By so doing, not only is there a waste caused of materials and labour, but the structure is weakened because it is not possible to make a good joint of fresh cement or lime with the mortar which has already set; again, the joints filled afterwards are likely to be neglected in respect of watering. The proper method is to rake out the joints when just fresh and fill them up with lime or cement; in this arrangement the mortar raked out is not wasted and the joints automatically get the water which is sprinkled on the masonry. A still better and the most economical way is not to rake out the joints at all, but to finish them neatly in the first instance and rub them hard with a mason's trowel the next day, saving double labour and material thereby.

This suggestion is applicable to plastering even with a greater force. Instead of wasting time in finishing the joints and again raking them out after some days prior to plastering, it is economical to leave them rough or rake them while making in the first instance.

(12) Settle, once for all, the plan of the building, stick to it and never make any changes or alterations except under the advice of experts who will consider the effects of such alterations on the work already done, the extra cost involved, etc., and guide you accordingly.

(13) Plain and simple architecture not only looks well but is also very economical. Bay windows, ingle-nooks, too many corners in the walls, and too many breaks in the roof are bound to increase the cost.

(14) If it is intended to add another floor in course of time, it is advisable in the interest of economy to construct in the first instance a flat or terraced roof at an additional cost of about 5 per cent of expenditure on the item of roofing. In that event the top of the terrace would ultimately form the floor of the upper storey, and the parapets when raised would become walls. Nothing would thus be wasted, whereas, if a tiled roof is required to be dismantled for the same purpose, not even 40 per cent of the material is found to be serviceable, all labour being wasted, besides.

(15) If the sinks, bath-rooms and w.c.s are so placed that all the

sanitary fittings come near each other, a considerable amount is saved, and also flushing becomes easier.

(16) A considerable saving may be made by buying materials at the proper time and in the best market and by maintaining a continuous supply of them at the job.

(17) On small jobs, in particular, work could be done more cheaply by using what are called "stock sizes." For instance, R.C.C. floors upto 12 ft. spans are cheap, as they require less steel, and less thickness of slabs. Teak wood for doors and windows upto $6\frac{1}{2}'$ height, and $4'' \times 3''$ section is comparatively cheap. As the size increases, the rate at once rises by 10 to 25%.

(18) Recently, teak costs 4 to 6 times as much as in pre-1950 days. Hence its use should be restricted to doors and windows. Even there, it can be substituted by treated soft woods, or country varieties resistant to white ants; or better still, by R.C.C. frames, which are much cheaper, and proof against attack of vermins, and are permanent.

(19) In these days cement has become very costly and often is unavailable, except at prohibitive black market prices. Besides, work is indefinitely held up. Its use therefore may be restricted to R.C.C. work only, and it should be substituted by lime with addition of *surkhi*. The latter increases the bulk and reduces cost, and gives equal strength to walls.

(20) Research has recently proved that for outside plaster lime mortar to which cement is added in the proportion of 1 to 10 is cheaper and better in every respect than cement plaster.

(21) Recently, wood and particularly teak wood has become very costly. Besides, for preparing panelled shutters with their numerous thin joints, lot of labour is required. Hence, instead of teak-panelled shutters of doors, if on a rough frame of any *dry* country wood shutter frame a sheet of a hard board, or even asbestos sheet is nailed and painted in some bright colour it looks like or even better than the modern, costly flush shutter and saves a good lot. This suggestion is for inner doors only.

CHAPTER III

Selection of Site

TWO different viewpoints, which are in principle antagonistic to each other, govern the consideration of this very important matter. The one is of a class of builders who may rightly be called speculating builders. They do not want to build for their own use but for that of others, and therefore, do not so much care for the internal arrangements and conveniences of houses as for the immediate maximum return on the capital outlay. Their tendency is to select a locality, which, though unimportant and not much in demand at present, is likely to rise soon into importance. The sites at such places are very cheap in the beginning but when they develop they fetch amounts several times their purchase value.

For the benefit of these people it may be suggested here that such localities may take years to develop, or, in some cases, may not develop at all. It all depends upon several factors not controlled or controllable by any one man or sometimes a group of men. It requires an uncommon shrewdness and keen foresight, which very few people possess, to judge those factors correctly. It is, therefore, advisable, as it involves no risk from the investment point of view to choose a street which has already developed. There we know the situation in its reality. The class and sort of people inhabiting that part, the rental value of buildings obtaining at the place, whether the latter is increasing or decreasing, and so on. Thus, though the return may not be so great, it is a sure source of income. Again, from the point of view of investment, if the building is not required for one's own residence, it is prudent not to build on a commodious scale. If instead of building one spacious house suitable for one rich family, several small independent flats or cottages suitable for middle or poor class families are built, there are very few chances of losses resulting from empties.

The other viewpoint of looking for selection of a site is whether it is for one's own residence or for that for a collective one—either industrial or co-operative housing. The considerations for the latter are slightly different. Those which are common to both are given here. They are in respect of (1) physical features (2) soil conditions (3) sanitary requirements and (4) practical conveniences.

(1) The site should be on elevated ground which is advantageous in two ways: (a) the outlook is wider and brighter and (b) it affords facility of drainage. Particularly, rain-water flows away from the building as soon as

it falls on the ground and the immediate surrounding area is left dry. A low-lying site, on the other hand, is likely to be damp and unhealthy, especially in the rainy season.

Rocky surface affords good foundations and also does not absorb any water, but it gets hot by day and does not readily cool down by night, especially in summer. Again, if any excavation or levelling of site is necessary, it presents difficulties. Laying of drains or excavation of gutters cannot be done satisfactorily except at high cost. Besides, it is not suitable for a garden or for growing trees.

Soft *murum* at surface with hard *murum* or rock within 3 or 4 ft. is the best soil; next best are gravel and sand. They easily drain off rain-water. But the possible rise of sub-soil water level in them is an undesirable feature, unless the site is lying high. Besides, there is a danger of their absorbing impurities from defective drains, cess-pools, etc., contaminating underground supply of water. Moreover, sandy and gravelly soils tend to make the house hot. In this latter respect, clay is better, and if firm, gives a good foundation; but if it is black cotton soil, it is the worst in this respect, requiring special expensive treatment of foundations and sub-soil drainage.

Trees grown in the neighbourhood, if thick, tend to keep the temperature equable and lend a charm to the landscape.

In the neighbourhood of the sea, the difference in the extremes of temperature is very small and there is a pleasant breeze blowing towards the land by day, and away from it by night, as the land gets hotter by day and cools sooner by night. The sea breeze is very exhilarating as it contains ozone. But the air near the sea is always humid which induces perspiration causing discomfort, languidness and enervation as it is often very sultry and oppressive. There is another disadvantage of sites in the neighbourhood of the sea, viz. the breeze, which carries with it a very thin spray of salty water, acts upon iron and causes it to rust. Trees and gardens also do not flourish in the neighbourhood of the sea for the same reason.

From the sanitary point of view, there should be no *nullas*, stagnant pools of water, old quarries, or tanks and wells in a dilapidated condition in the neighbourhood of sites. If the wells are in good condition with a copious supply of pure water, their existence adds to the value of the site.

The site should not be on reclaimed ground, i.e. ground which was once a depression and filled up afterwards with some animal and vegetable refuse. In the first place, such ground absorbs water, becomes waterlogged, and very often the stuff putrefies giving out foul gases, most detrimental to human health. Secondly, there is a likelihood of the nuisance of flies breeding in the refuse in the ground. Thirdly, there is always a risk of an uneven

settlement of the foundation and all the dangers to the building consequent upon it—a state which can be remedied only at a prohibitive cost.

A busy street, though desirable from a business point of view, is quite unsuitable for residential purposes, since the nuisance of dust caused by heavy vehicular traffic is positively harmful, and the constant noise created thereby deprives one of rest, especially during sickness.

Pens of cattle, cesspits, lime or charcoal kilns, tanneries, ginning factories, etc., giving out smoke, foul odours and objectionable noises, should be avoided even in a distant neighbourhood. Lofty buildings and tall trees obstruct the breeze. The latter should be under one's control so that they could be pruned or lopped off at any moment without trespassing on the rights of anybody else.

A good and sufficient supply of drinking-water should be close at hand. In rural districts, it is an ideal condition to have one's own well. If it be a public one, its water must be beyond any chance of being polluted even at any future date.

From a practical point of view, the proximity of a railway station is obviously beneficial (not very close as otherwise sleep is disturbed—a very important point in sickness), a public but not a very busy street, a post office, a hospital, a bank, a school, and the market. Of these, it is absolutely necessary for middle and lower classes to have the school not very far off.

It is necessary in the interest of the permanent happiness of the family to have a good neighbourhood.

A free-hold site is infinitely superior to a lease-hold one. Before finally settling the bargain, the legal aspect of the question should be scrutinised with the help of a lawyer.

It is advisable to make provision for additional space of land so that it would be easy to add a wing afterwards to prevent congestion.

CHAPTER IV

Orientation

PROPER orientation means that setting, or facing, of the plan of a building which allows the inmates of the house to enjoy to the utmost whatever is good, and to avoid whatever is bad in respect of comfort in the elements of nature, such as the sun, wind, and rain. Attention to this important factor, particularly in the tropical countries, is of great moment. The word "orientation" has been used here in a broad sense. It implies not only the direction of the main front of the house, but also the back and two side facings.

Good orientation means proper placement of rooms in relation to the sun, wind, rain, topography and outlook, and at the same time providing a convenient access both to the street and backyard.

According to the Hindu orthodox principles, a building should not, as a rule, face the south. But the wise men of old have provided an exception to this rule, viz. that there is no objection to this, provided there is a house or row of houses on the opposite side facing the north. In most of the western countries of Europe, an aspect which gives the maximum sunshine, is preferred. In those latitudes, the sun never goes overhead, i.e. it is always to the south of the zenith. Besides, the climate of those places being very cold, the warmth of the sun is most enjoyable. Hence they provide for a southern aspect which gives them the maximum sunshine throughout the year. Here in India and in other tropical countries, what is sought for is just the opposite. We want to devise means to reduce the sun's heat to a minimum, especially in summer, when its rays strike us vertically, or nearly so.

The sun's action in causing heat is mostly direct by day, but by night it is entirely indirect. Stones, bricks and tiles, etc., of which the walls and roof of a house are composed, absorb sun's heat by day which they slowly radiate by night. While doing so, the air in contact with them is heated, which is the real cause of discomfort by night. Hence, proper orientation must protect the house from both, i.e. sun's direct heat by day and the indirect one by night.

Let us first consider the direct heat by day. The temperature of a place, though, no doubt, modified by several local influences such as proximity of a sea-coast, hills, valleys and sandy deserts, etc., or also by the elevation above sea-level, soil, vegetation and woods, etc., is mainly governed by the latitude of the place, or, which amounts to the same thing, the altitude of the sun above the horizon of the place. The mean daily altitude of the sun is highest

in tropics or the torrid zone, and decreases as one goes either northward or southward towards the Arctic or the Antarctic zone. The total heat absorbed depends, again, on two factors, (1) the intensity and (2) the duration. The aim of proper orientation must be to admit the required amount of sunshine into the house in the morning when it is very pleasant and the intensity of its heat is less, and to minimise its duration in the afternoon and evening when its rays are again likely to enter the house. In the noon-time the sun is generally overhead in the tropics and, therefore, its rays are not likely to enter the house.

The sun's rays are potent to kill disease germs, but for that purpose severe heat is not necessarily required. The morning sun not only does it satisfactorily, but lends cheerfulness in addition, coming as it does after the chill and darkness of the night. The reason for this is that there is full light but very little heat in the morning sunshine. The cause of the less heat is threefold: (1) The morning sun is inclined at a low angle with the horizon; its slanting rays being spread over a larger area, bring to each square unit of surface less heat and thus diminish its effect. (2) The oblique rays have to pass through a greater thickness of atmosphere which has already cooled down by the night, and again, (3) The air in the morning is charged with water vapour which allows the light rays to pass freely but absorbs the heat rays in their passage. As the sun rises, its rays fall more and more vertically, and heat becomes more and more concentrated. The moisture in the air also slowly disappears and the heat rays are less and less absorbed. In the afternoon and evening, even though the rays are again slanting, the air being dry, heat rays which are no longer absorbed are intensely felt. That is why the evening sun is not so pleasant and charming as it is in the morning, and therefore is abhorred to a certain extent.

Thus we see that a certain amount of sunshine inside the house is not only desirable but welcome. However, when we have had enough of sunshine, and it becomes warmer, it should be shut off. Mere closing down of windows for this purpose is not sufficient, because in that case it will still heat the walls, and their radiation will make the rooms on that side quite uncomfortable. Hence we must so set or face the building that the sun's rays will be effectually excluded without closing windows in the late hours of the morning, especially in summer.

By the facing of the building is meant the placing of such rooms which are mostly occupied during the day-time, on that side, and providing large windows in the walls on that side with projecting *chhajjahs*, or sunshades, at their crest in order to regulate the inflow of sunshine. These should be located at such a height and should project so much beyond the wall that as soon as

the morning sun rises above a certain height and the air becomes warm, its rays should be automatically cut off by the projection casting shade on window area. However, the sun is welcome and enjoyed much longer in winter than in summer. The ideal would, therefore, be accomplished if the sunshades are so designed that they are capable of being raised or lowered, and also rotated about a horizontal axis at varying angles so as to keep them in any desired position and at any desired inclination according to the season.

If a certain amount of sunshine is allowed to penetrate into the house during early morning hours, it is bound to do so also a few hours in the late evening on the opposite side, to effectually exclude this and render it harmless, deep verandahs on the south and west side have to be provided.

We have discussed above how it is possible to regulate the sunshine, but it is not the only factor contributing towards comfort. Air in motion, or what is called breeze, and aqueous vapour or the relative humidity in the air are equally or perhaps more important than heat. It is the general experience that in spite of a low and equable temperature of sea-coast places, a still atmosphere which does not materially help evaporation, causes greater discomfort at those places than a comparatively high temperature in dry, arid plains, accompanied by a breeze. A high humidity causes perspiration, and if the atmosphere be calm and still, which does not cause evaporation from the surface of the human body, what is called "sultriness" is the result.

The direction of the prevailing wind, especially in summer, when it is most needed, is between the West and South. The exact angle depends upon a number of local influences which need not be discussed here; to derive the maximum comfort from the breeze, the bed-rooms which are occupied by night must be located in its direction, but if they are directly exposed to the afternoon sun, they are heated and the radiation of their heat by night, as we have seen above, will warm the breeze and make the rooms hot and uncomfortable. Hence, deep open verandahs both on the South and West are necessary.

To recapitulate, for proper orientation, (a) place all the rooms which are usually occupied by day on the North and East and (b) place the bed-rooms in the direction of the prevailing wind and provide deep open verandahs to protect them from the heat of the afternoon sun.

Another way to prevent walls from being heated is to build on their outer surface, especially on the west and south a framework of concrete, so that it freely admits the sun when it is low and pleasant; but as soon as it gets warm and oppressive, the framework protects the wall by casting a shadow. This was first successfully done at Chandigarh, and subsequently copied at Bombay and elsewhere.

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CHAPTER V

The Plan

AS A general rule, the shape of a plan is governed by the configuration of the building plot, and its nature—whether compact and closed or extended and open—is influenced by the climatic conditions of the place.

Thus at places where the climate, either very cold or very hot, is the deciding factor, the plan needs to be compact and closed. For example, on a hill-station like Simla, on account of the extreme cold obtaining there, a closed, compact plan—a square or a rectangle approaching a square in shape, with an inner central passage to serve the rooms instead of outside verandahs—is a very convenient one. Similarly in the plains, at Allahabad for example, the extreme heat in the summer is the governing factor, and it makes obligatory to design a house with one or two central lofty apartments, ventilated and lighted by means of clerestory windows below the ceiling. Round these apartments are grouped other rooms, and beyond these rooms are built verandahs on the West and South, to shelter the walls of these rooms from the direct rays of the afternoon sun. During the hot days, the outside hot air is excluded by closing the apertures so that the inner rooms, particularly the central apartments, remain cool.

In places on the sea-coast, at Bombay and Madras for example, on the other hand, it is the moisture and not the heat which mainly affects comfort. The object here is to expose as much area of the house to the outside air, and admit as much breeze into the rooms as possible. Hence, an open, extended plan resembling the letters L, E, U or H, with large windows in outside walls is very suitable. Further, there should be as much open space in front and around buildings as possible. Areas of rooms should also be large, it does not matter if the height is curtailed.

At places other than these, i.e. the places which are situated neither on hills nor on the sea-coast, and which do not have the climatic conditions similar to those on the plains, there is neither extreme cold in winter nor extreme heat in summer, and unless there is a large surface of water like that of a lake or a river in close proximity, the weather is comparatively dry. At these places, the extended plan not only makes for comfort but also for the preservation of health.

A number of varying factors affect the consideration of planning a domestic building. Hence, no very hard and fast rules can be laid down

for general application. No two sites could possibly have identical conditions. Individual requirements and idiosyncrasies, which could never be alike, lead to a number of varieties in it. The situation of the site, whether in town, suburb or in the country, plays an important part in the determination of the plan. That, again, differs according to the amount of accommodation required, by reason, too, of its alternative treatment, whether a "detached," "semi-detached," "flat," *chawl*, a cottage or a bungalow, and so on. Even in a town it may differ according to the street, neighbourhood, aspect, surroundings, also rental value and restricting bye-laws of the local authority.

In spite of this variety, certain features which govern the theory of planning are common to buildings of all classes intended to be used for residential purposes. They are enunciated below:

- | | |
|---------------|-------------------------------|
| (1) Aspect | (6) Furniture Requirements |
| (2) Privacy | (7) Sanitation |
| (3) Prospect | (8) Flexibility |
| (4) Grouping | (9) Circulation |
| (5) Roominess | (10) Practical Considerations |

(1) **Aspect.**—By aspect I mean the peculiarity of the arrangement of the doors and windows in the outside walls of a dwelling, which allows it to enjoy to the utmost the gifts of nature such as sunshine, breeze, view of the landscape, etc. This is a very important consideration in planning. It is a truth universally admitted that one's thoughts are moulded by one's surroundings; that outside influences play an important role in the development of the human mind. If they are pleasant and cheerful, people living in their midst are contented and happy; if, on the other hand, they are dull and dismal, they cast a gloomy shadow on their minds. It is for this reason that people of humble means living in small cottages stand most in need of the two factors, viz. Aspect and Prospect.

A building must be designed to suit the site with all its varying aspects. Aspect not only provides comfort but is requisite from the hygienic point of view as well. The value of the sun's rays cannot be over-estimated. They are potent destroyers of organic poison of spreading diseases, and lend a cheerful and genial air to the rooms. With a careful disposition of windows, it is possible to admit sun's rays into any desired room. A kitchen should have an Eastern aspect so that the morning sun would purify the air in it, and it would remain cool in the latter half of the day; the bed-rooms should have a S.-E. or S.-W. aspect; the drawing-room, N.-E. or S.-E., and so on.

(2) **Privacy.**—This is next in importance in the design of domestic dwelling. If they lack in the respect of privacy, it is a deplorable fault which

cannot be compensated for by a host of other merits. Privacy is of two kinds: (a) The one is in respect of screening the interior of any one room from the other rooms of the house and also from the main entrance, while, (b) the other is the privacy of the whole house from the high-ways and by-ways. The latter is, comparatively speaking, easily secured by carefully planning the entrance and screening it with trees or creepers trained on a trellis. But the former requires a carefully thought-out plan. The internal privacy of a domestic house could be maintained in the following ways:

(A) Proper grouping, i.e. disposition of various departments and parts of the building in their relation towards each other, which, particularly in economic and compact planning, requires great skill on the part of the architect.

(B) Proper disposition of doors. For instance, if a door is fixed in the centre of the shorter wall of a room or, diagonally in a corner, the interior of the whole room is exposed to view, whereas if it is fixed in a corner of the longer wall, the larger part of the room is screened.

(C) The mode of hanging doors.

(D) Provision of a small corridor or lobby.

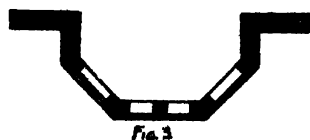
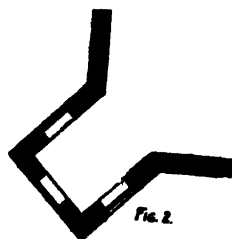
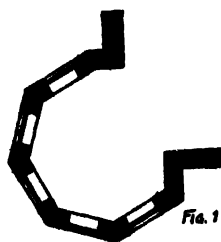
All the above methods have been illustrated further on in this volume with concrete examples in the notes describing various designs.

Privacy is of supreme importance in the following rooms in particular: bed-rooms, and all rooms in which sanitary services are usually provided, such as toilet-rooms, water-closets and earth-closets, urinals, bath-rooms, etc. The kitchen department also should be kept out of the view of the passers-by. As far as possible, every room—except perhaps the drawing-room—should have an independent access to it. Again, services such as bath-room, toilet and w.c. should have an independent passage to them from every room, and the real skill of the architect lies in so disposing of the rooms with respect to the position of the services that a minimum space is occupied in these passages. This is called compact planning which is the very essence of economical designing.

“Privacy” is not the same as “seclusion.” The latter is sought to be secured in a room for prayers, in a study, or in a library. A business man’s or a manager’s office is strictly private, though in the interest of business it cannot be located in a secluded corner; on the contrary it must be situated in a prominent place easily accessible to the public and situated in the centre of the various departments.

(3) **Prospect.**—In its proper sense, “prospect” has reference to the impression that the house is likely to make on a person viewing it from the outside. It includes taking full advantage of the beauties of nature in the

landscape by revealing to a stranger certain pleasant features, and also by concealing from his eye some undesirable ones in the general appearance of the house. It must not only be attractive in external appearance but must also possess such qualities as comfort, cheerfulness, security, labour-saving and up-to-dateness. It must also prove a good investment. The sense of pride that one's own house has not only a smart, pleasing appearance but a certain individuality which differentiates it from the houses of others and the effort to maintain that individuality which occupies part of one's time, are potent factors in the amelioration of life of the poor who have otherwise continually to struggle against odds in life. Undue prominence, however, should not be given to this feature, and it should not be the only or even the principal desideratum in designing the elevation of domestic dwellings, particularly for housing the middle or poorer classes. Just a small projection here, a bay window there, casually provided to break the dull monotony at a small extra cost, which, considering the benefits it gives, is not only justifiable but necessary. This should not, however, be treated as an extra item in the estimate and considerable money spent over it. Bay windows not only fulfil this requirement, but in addition help in giving breeze, light and sunny aspect all the year round. Some of the forms of bay windows are shown below:



These are, however, out of fashion in these days. Besides, compared with the advantages, they cost very much at present.

(4) **Grouping.**—Grouping means the disposition of rooms in respect of their relative positions towards each other. If a building fails in this respect, no amount of care taken in all others is of any avail. The dining-room must be close to the kitchen: the latter again, must be away from the drawing or the main living-room, otherwise kitchen smells and smoke would detract from their usefulness. Services must be nearer to, and independently accessible from, every bed-room. The w.c.'s etc. must be far removed from the kitchen and dining-room, and so on. This subject has been treated in detail later on in a special section under "Grouping."

(5) **Roominess.**—Roominess is the opposite of crampedness. It has a reference to the effect produced by making the best of small proportions of rooms, by deriving the maximum benefit from the minimum dimensions of a room; or to accomplish economy of space, at the same time avoiding cramping of the plan. It looks so simple a task at first sight, but is really so difficult an art that it often taxes the brains of the architect. A room whose walls are disproportionately high looks much smaller than it actually is. Similarly, if the length of a room exceeds $1\frac{1}{2}$ times its width, it produces a cramped effect. A square room looks smaller and in respect of utility it is really so as compared with an oblong one of the same superficial floor area. For example, if a small table is placed in the centre of a room $10' \times 10'$, the small space equally divided on all its four sides is much less useful than the extra space left on two sides of it in a room measuring $12' \times 8\frac{1}{2}'$ which has practically the same area. Every square foot of the area under roof costs 11 to 20 rupees. Hence, the maximum advantage must be taken of every nook and corner of the house before thinking of making an addition to the plinth area. Plentiful provision of wall cupboards should be made; even the narrowest space under the flights of stairs should not be disregarded. It should be enclosed and turned into a useful store-room. The space in the walls below the window-sills down to the floor level, could be used by way of a cupboard. This latter arrangement provides a cupboard at a very cheap rate, because it dispenses with an extra lintel or arch. Provision of such conveniences together with one or two lofts below the ceiling in unimportant rooms and a few wall-shelves supported on brackets, would render it unnecessary to set apart a separate store-room in small cottages.

(6) **Furniture Requirements.**—This matter, though of considerable importance, is often most neglected. Bed-rooms must be designed with due thought and attention to the prospective position of the beds. Otherwise the latter have to be cramped up somewhere in it, either in a position exposed

to view, or opposite to a window facing a strong draught of wind or against a cupboard, which cannot be then opened. Even now I can vividly picture before my mind the house of a friend, visited some time ago. It was elaborately treated in respect of rich external decorations, but the sitting-room was too small to accommodate a table in the centre consistent with sufficient elbow room. Another room could not accommodate a bed in any position without coming in the way of either a wardrobe, or a door, or a window. It is best, therefore, to show in the plan the positions not only of beds but also of heavy pieces of furniture such as sofas, almyrahs and Chesterfield suites, and even of pegs. It is necessary to exercise forethought and imagination in this respect.

(7) **Sanitation.**—Sanitation is of very great importance for a dwelling, because on it depend the health and the happiness of the inmates. Sanitation embodies provision for ample light and ventilation and due attention to general cleanliness and sanitary conveniences.

Light.—Absence of light has a deleterious effect even on plants, which, if placed in a dark room, soon lose their lustre, and oftentimes droop and die. People who have to work in mines, cellars and other dark places look pale and anæmic. This is due to the fact that sunlight, direct or diffused, acts directly upon the corpuscles of the blood and makes the blood flow vigorously with its natural bright red hue. Sun's light, not even direct but diffused, is found to be potent to destroy germs of tuberculosis. Hence, too much stress cannot be laid on getting light into the house as profusely as possible. There should not be a single corner in the whole house which is not sufficiently lighted. Particular care must be taken to light passages and staircases—the places where there are chances of collision and accident taking place. As far as possible long and narrow passages which are difficult to be sufficiently lighted should be avoided. If they are at all unavoidable, sky-lights should be provided in addition.

Cleanliness.—This includes, also, the means provided for cleansing. In India water carriage and sewerage systems have developed only in a few large cities. There it is comparatively easy to keep the premises clean, but in other cities and towns and in all rural districts this matter is very much neglected. In this connection, the following extract taken from Dr. Poore's *Rural Hygiene* will be found to be very useful. In country districts, every cottage ought to have a bit of garden—about one-half of an acre or more, and adopt the following system of sanitation:

(1) "All excrement should be kept out of the drains; for, by doing this the putrefaction of the solids is prevented and the purification of the liquids by filtration through the earth is effected with ease which is proportionate to the thinness of the fluid.

(2) "All solid matter should be removed every day from the immediate neighbourhood of the house and buried in the top layer of cultivated ground. This surface layer is full of living organisms which rapidly disintegrate and oxidise any substance deposited in it, until in a very short time—in summer, within less than a week in tropical countries like India—the filth becomes fertile "humus" or mould. Household slops should be poured on to the surface of the garden and the mistake of attempting what is called sub-soil irrigation must not be made.

(3) "Earth closets and latrines with movable pails should be outside the dwelling house, approached by a covered passage, with a cross-ventilation. Sifted garden mould, taken from the top layer and dried in a shed—not by a stove—is most suitable for use. If specially constructed, as in Denmark, Sweden and Norway, so as to separate liquid from solid deposits, and if kept from household slops and other liquids, earth closets are not only free from nuisance but will provide valuable manure.

(4) "With regard to other solid refuse, the rules must be—

(a) Whatever is capable of rotting must be put in a heap to humify.

(b) Whatever is not capable of rotting must be burnt.

(5) "As for domestic slop water (kitchen waste water), it must never be discharged from the house below the level of the ground. The coarser impurities must be strained out by passing it through a filter of gravel or cinders, and in its transit to the filter-bed it should be kept freely exposed to air in its entire course. If this is done, the exposure to air, sun, heat, cold, and drying winds, hold putrefaction in check, and render impossible the escape of foul gases into the house. The key to success is the separation, in every possible way, of solids from liquids."

Dust is a great enemy of health and its proper significance is not adequately understood in India. Most of the diseases are spread by it; hence one should strive to minimise the chances of accumulation of dust and other decaying matter. This could be done in the following ways:

(1) No mouldings, not even skirting and cornices, should be allowed, particularly on the inner surface of walls.

(2) Ledges, nooks, crevices and all unseen spaces which could possibly give dust a lodgement, should be avoided.

(3) All edges and corners should be rounded.

(4) Angles made by junctions of walls with floors and ceilings should be rounded.

(5) Non-absorbent materials like glazed tiles should be provided in the w.c.s and kitchens for flooring and skirting all round the walls.

(6) Trellis work in verandahs should have large apertures to facilitate cleaning, and railing of galleries and balconies should be of a plain and simple design for being easily cleaned.

Ventilation.—In providing windows for ventilation, particularly in *chawls* and apartment houses, the habits of the people likely to live in them should be taken into account. Over-ventilation is harmless while under-ventilation is positively harmful. Hence there should be a tendency to err on the safe side by providing more ventilation than is absolutely necessary. In designing *chawls* and similar buildings, provision should be made for sufficient ventilation even though the windows may be closed for fear of draught as is the wont of the people occupying them. This could be done by providing floor ventilators in the walls facing an open space. They should be about 18 inches long and 5 inches high, closed by fixed venetians or “hit-and-miss” sliding shutters as shown in the sketch (see Figs. 8 & 9).

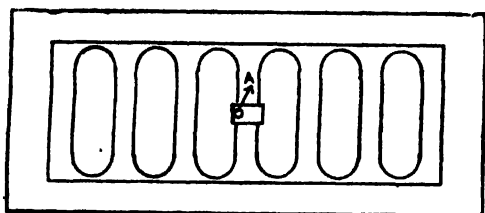


Fig. 8

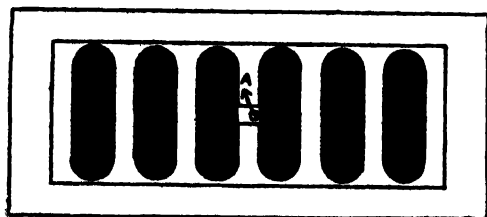


Fig. 9

Whenever there is a high wind which is likely to cause an exposure to a person sleeping on the floor (which is the practice in many parts of India) the movement of the button A, one inch either way, could partially or wholly close the apertures. In addition to these, ridge ventilators near the ceiling are required. For these, either bull's eyes or clerestory windows should be provided a little below the ceiling; or better still, the main windows should be carried to within 6 inches or a foot below the ceiling. The theory is that the lower layer of air in a room which is warmed by the human breath and to a certain extent by the radiation of heat from the human body, becoming

lighter by the warmth, rises to the top. Unless efficient means like windows near the ceiling are provided for driving it out, it is likely to cool down, become heavy again, descend, and be necessarily inhaled. It is injurious to health because it is devoid of oxygen which has already been used up.

A still better arrangement than the floor ventilators is to build pre-cast concrete *jalis* not only in outer walls, but also in inner ones just below the ceiling. A large variety of them are available in the market of various ornamental designs. They are cheap and lasting, and just below the ceiling they do not require lintels on their top. They serve as excellent ventilators. They do not require shutters and still do not cause draft.

Ventilation means much more than simply supplying fresh air to a room. It also connotes the evacuation of the vitiated air and the maintenance of a movement of air in the house.

Movement or lack of movement of air is conducive to a feeling of well-being or discomfort, or leading, in the latter case, to serious results. Lack of movement of air leads to increase in temperature, increase in humidity, which leads to hindrance of evaporation from the body surface, heat accumulation, and finally heatstroke.

For a thorough ventilation, one large window situated in the centre of an outer wall is not sufficient, but there should be another window or windows in the opposite wall.

This is called "through ventilation." In order that the air in every nook and corner of a room should be renewed, two or three apertures distributed over the whole wall, exposed to an open space, are preferable to one large window fixed, instead, on it.

The so-called effect of "stiffness" in a crowded room is caused not only by the partial exhaustion of oxygen and the presence of an undue amount of carbonic acid gas in it, but more by the fact that the human exhalations are warm and contain an amount of water vapour. They are, moreover, charged with microscopically small particles of organic matter (part of which also deposits on teeth) which gives a foul oral smell. In addition to this, the humidity and warmth caused by the breath induce perspiration on bodies of people occupying the room, which also adds to the smell, and all these contribute to cause that well-known feeling of "stiffness." Hence the function of satisfactory ventilation must be four-fold, to create,

- (1) A sensation of comfortable coolness to the body,
- (2) Freedom from bad smell,
- (3) Reduction in humidity,
- (4) Proper supply of oxygen.

All this must be secured without producing a perceptible draught.

The relation of window area to that of the room and the cubic capacity of space to be allowed per head are described while dealing with bed-rooms under "Grouping."

(8) **Flexibility.**—This means making a room, originally designed for one specific purpose, serve other overlapping purposes also. For example, in the houses of small middle class families which cannot afford to employ a cook, the kitchen should be so designed as to serve both the purposes of cooking and dining, even though there may be a separate dining-room in the house. For instance, the school children want their meals served early so as to enable them to attend school on time, or Saturday early movies require that the evening meals should be taken early. However, either the meals may not be fully ready, or though ready, some finishing touches may have yet to be given to some articles before they are ready to be served. By the arrangement of the kitchen designed to function in both these ways, the housewife can conveniently serve the articles which are ready and at the same time give the finishing touches to the others. As another instance, children require from the first creep to about the fourth year some space for their play, as far as possible under the supervision of the mother, and the supervision is most effective when the child is the least conscious of it. This is possible either in the dining-room or on a verandah adjoining the kitchen, if these are specially designed and located so as to serve these overlapping activities. A house planned on scientific principles must, within a small space, provide for innumerable similar activities such as listening to the radio, child home-work, entertaining guests, relaxation or prayer in a space away from the hubbub of the house, festive occasion such as the arrival of the first baby, holiday dinners, birthday parties, wedding banquets, religious congregations, and so on—all these and many others have to be provided for within a small space within economic limits, and this is only possible if special attention is given to flexibility. This subject is discussed further under "Grouping of Rooms."

However, some activities conflict with others. Therefore, it is next to impossible to provide perfect flexibility even in large houses. For instance, the child-play is an important and necessary activity, but it is not permanent. Besides, as the child grows stronger and older, its play consisting of running, jumping, playing with a toy horse, or a railway engine with its whistle or an electric engine with its siren, blind-man's bluff, or even a football play, occupies not only the space in the entire house, but the premises around, and sometimes even the streets, and is necessarily noisy and boisterous, and, therefore, what is right for the child is often an annoyance and a veritable

nuisance, particularly to the older members of the family who want a calm and quiet atmosphere for their relaxation or prayers.

When it comes to finding out a practical solution, a compromise has to be effected. In respect of the convenience and facility for the children's play, the dining-room or the verandah—should either often adjoin the kitchen—would, with spaciousness and a large window or door at a convenient place, enable the mother to superintend the children's activities. For more grown-up children a large terraced roof with sufficiently high parapet walls, or a safe and strong railing, is an ideal place, at least for 8 to 9 months of the year.

In respect of other activities, folding partitions are the best solution. They make it possible to meet not only the seasonal, but even the daily needs of the family. I have actually seen a number of houses in France and Germany in which the internal walls were only light partitions, which, having no structural function to perform were removable, enabling several bed-rooms to be made at night and the same to be converted, by day, into a large drawing room.

There are two ways to meet the demands of festive occasions or religious or social congregations. One is to combine the drawing-room and the dining-room by a removable partition or a screen between them, and the other is to dine in the open air. For this a convenient access should be provided from the kitchen to the yard, or the garden and the space should be screened from the public gaze.

This and the next important subject, viz. Circulation, will be dealt with again along with the discussion in the chapter on "Synthesis of a Home," and a number of practical instances will be given in the plans and commented upon in the notes on the constructional outlines of plans.

(9) **Circulation.**—In order to preserve the privacy of every room and also not to disturb any member of the household doing his or her work, a straight, short and separate passage is required. This passage which is the means of circulation should be direct and well lighted. Circulation is of two sorts: one, horizontal, i.e. on the same floor, and the other, vertical, or from one floor to the other, either below or above it. As the staircase is the only thoroughfare for the circulation from one floor to the other, the latter is perhaps more important. Again there must be a proper circulation provided not only outside the rooms, but also within the rooms. The latter means that the shape and size of the rooms and also the design and arrangement of the doors and furniture must be considered.

Bad circulation within a room detracts considerably from its usefulness, and if there is no good circulation in a house, much of the pleasure and comfort is lost. It is a criminal negligence on the part of the designer if one

has to enter another's bed-room in order to reach a bath-room or his own bed-room. Particularly the sanitary services and the staircase must have an independent access from every room through a lobby, though small.

In places where there are no drains on the water carriage system, an independent access to bath-rooms and privies must also be provided from the outside for the scavenger.

In houses with five or more bed-rooms, there should be an independent stairway for the servants other than the main one.

(10) **Practical Considerations.**—The following few hints in connection with planning will, it is hoped, be appropriate at this point.

(a) Strength and stability, coupled with convenience and comfort, should occupy the first place of importance, and embellishment the next.

(b) Simplicity and effect of strength lend lasting beauty and grandeur to a building, which petty plaster mouldings and vain decorations do not. If a moulding is cracked or the edge of a corner knocked off, it is difficult to thoroughly repair it. Colours fade away and unless frequently renewed at a great recurring expenditure, the building on the contrary looks ugly.

(c) One should always bear in mind that a house is called an immovable property, and once built, is calculated to last for several generations. One has, therefore, no right either to practise false economy and erect a weak structure which fast depreciates in value requiring continual repairs; or on the other hand, build under false ideas of dignity a costly structure by incurring a heavy debt beyond one's means of repayment.

(d) In the years to come, a man may perhaps have to add a wing or extend some part of the house. Provision for this should be made while building in the first instance, so that some part already built may not be required to be dismantled at the time.

(e) Though a person is at present hale and hearty and perhaps in the prime of his life, while building a new house he should remember that old age with its attendant infirmity is sure to overtake him, and sickness which human flesh is heir to, may attack him sooner or later in course of time, as it always does in nine cases out of ten. Hence it is always prudent to have one room preferably on the ground floor designed mainly for comfort which will also be a hospital room for the old and sick members of the family, and in times of health and happiness, will prove to be a luxury. This question has been dealt with while discussing "Grouping" in the next chapter.

Analysis of a 'Home'

IT IS proposed in this chapter to analyse a "HOME" according to its different functions and see what apartments should be allocated, both in small cottages and large houses, to fulfil them.

The word "HOME" connotes far more than a house, giving a mere shelter for protection from the elements. It is a centre of social life; a place of health, comfort and happiness of the entire family in all stages and conditions of life, viz. infancy, childhood, manhood or womanhood and old age—also in health and in sickness; a place where the bodies and minds of the young children are nurtured so as to fit them for shouldering their responsibilities as future citizens. It is the expression of home life, a personification of the activities, tastes and emotions of its members and so on. Hence, in order to merit the title of "HOME," it must provide adequately for the following life activities of the family.

Function	Space Allocation
(1) Cooking: .	In small cottages, a room for kitchen inside a house. In large houses a cook-room preferably away from the main house and attached to it by means of a covered passage.
(2) Dining: ..	
(a) Morning tea and breakfast	Kitchen or the adjoining verandah.
(b) School children's meals	Kitchen.
(c) Family meals ..	A separate dining-room, or dinette.
(d) Small parties ..	Combination of dining-room and drawing-room.
(e) Festive occasion ..	Courtyard or garden.
(3) Rest and Relaxation:	
(a) Conversation ..	In small cottages, the front verandah.
(b) News and other light reading ..	Staircase hall or the drawing room.

- (c) Afternoon tea .. In large houses, lounge or staircase hall or the drawing-room.
- (4) **Sleeping:**
- (a) Indoor sleeping in winter and monsoon .. Bed-rooms.
- (b) Outdoor sleeping in summer .. Back verandah or roof terrace.
- (5) **Study:**
- (a) Children's home lessons Front verandah or dining-room in small and a separate room in large houses.
- (b) Doing work brought home from office .. Bed-room or attic in small cottages. Study-room or library in large houses.
- (c) Serious reading or study Bed-room or attic in small cottages. Study-room or library in large houses.
- (6) **Child-play:**
- (a) Confined—as in the case of babies .. Dining-room or a verandah close to the kitchen in small cottages, and nursery room in large houses.
- (b) Free—as in the case of grown-up children .. Roof terrace or courtyard.
- (7) **Storage:**
- (a) Pantry: .. A small store-room attached to the kitchen, in small cottages, a separate large store-room in up-country houses.
- (b) Larder for dairy products .. A wall cupboard (with wire gauze shutters in front, and air bricks, behind) in the kitchen in small houses, a refrigerator in large houses.
- (c) Cupboards .. Wall cupboards in dining-room, kitchen and lobbies.
- (d) Closets or wardrobes .. Wall cupboards or separate closets in bed-rooms, and front entrance.

(e) Lumber room .. A small cellar or separate room attached to out-houses in large establishments.

(f) Coal or fuel .. An underground cupboard with shutters flush with the floor in store-room near kitchen or dining-room in small cottages and a separate fuel shed or a cellar-room in large houses.

(8) Concentration:

(a) Thinking .. An attic-room or a bed-room in the small house and library in large ones.

(b) Prayers or religious worship .. A secluded, closed alcove preferably not far removed from the kitchen or dining-room in small houses, a separate small room in large ones.

(9) Recreation:

(a) Listening to radio .. Drawing- or living-room in small houses. Lounge or drawing-room in large ones.

(b) Boy's handicrafts .. Back verandah or a separate shed outside, depending upon the nature of the craft.

(c) Girl's music .. Dining-room.

(d) Ladies' needle-work and home-stitching .. Dining-room in small houses. The lounge or a separate ladies' apartment in large houses.

(e) Men's hobbies .. Allocation of space depends upon the nature of the hobby.

(10) Toileting:

(a) General make-up .. A corner with a looking glass in the dining-room or ladies' apartment in small cottages, and a separate dressing- or toilet-room in large houses.

- | | | |
|----------------------|----|--|
| (b) Bath-room | .. | A small room adjoining kitchen' on the ground floor in all houses, and at least one separate general bath-room on the first floor, or a room attached to every bed-room in large houses. |
| (c) W. C. and Urinal | .. | Inside the house one on each floor, if there is a water carriage system available. Otherwise detached one outside the house. |

(11) Reception:

- | | | |
|--------------------------------|----|--|
| (a) Casual short-time visitors | .. | Front verandah, lounge or drawing-room, according to the status and relation of the visitor. |
| (b) Guests | .. | The front verandah or the drawing-room in small cottages. Guest or study-room or library in larger houses. |

(12) Drying clothes:

Open yard by the side of, or behind the dining-room and kitchen in fair weather season. A few *dandies* hung from the ceiling in the back verandah or dining-room in the wet season in small cottages, and a separate rear yard in large houses.

(13) Entering and leaving the house:

- | | | |
|-------------------|----|----------------------------------|
| (a) Main entrance | .. | In front verandah. |
| (b) Back entrance | .. | In the back verandah or kitchen. |

In large houses there should be not only a separate entrance for the servants, but also an independent small staircase leading to the lobby.

Grouping or Synthesis of a 'Home'

IN THE foregoing chapter we analysed the "HOME" according to the different functions into various apartments. It is now proposed to show how all these apartments are to be grouped or assembled to make it a real "HOME." Upon the way in which the various rooms or appurtenances are arranged, depend very largely the efficiency, comfort and health of the inmates. This statement is particularly applicable to the smallest cottage. The more limited the space, the more necessary it becomes to utilise, to the best possible advantage, every available inch.

From the discussion in the last chapter it would be clear that the maximum accommodation required by an Indian family consists of the following appurtenances:

- | | |
|-------------------------|-----------------------------------|
| (1) A Verandah | (9) Worship or Prayer-room |
| (2) A Drawing-room | (10) A Bath-room |
| (3) Bed-rooms | (11) A Stair-case |
| (4) Dressing-rooms | (12) A Comfort-room |
| (5) Kitchen | (13) A Guest-room |
| (6) Dining-room | (14) A Nursery or Children's Room |
| (7) A Ladies' Apartment | (15) A Latrine |
| (8) A Store-room | (16) A Garage |

Detailed discussion of grouping of all these will cover the requirements of families of all grades of society.

(1) Verandah

A verandah, or at least an open terrace, is almost an essential feature of an Indian home as it serves many purposes. Firstly, it is used for keeping shoes, sticks, umbrellas, etc. directly as one enters the house; and also for storing prams and cycles. Secondly, it serves the purpose of a waiting-room for a stranger or a visitor before he is ushered into the reception or drawing-room. Thirdly, it serves as a passage giving an independent access to other rooms of the house, thus preserving their privacy. The fourth purpose is its use for sitting in the evening or by night after dinner, enjoying some light reading or post-prandial talks with friends in a flow of cool breeze. In the cottages of people of humble means, this is often the main sitting-room. The fifth, and most important purpose served by a verandah is that it protects the

walls of the house from being heated by exposure to the sun's rays. This it does in two ways: firstly, by sheltering or screening the wall from the sun's rays, and secondly, by offering to them a buffer or a sort of cushion of air which is a very bad conductor of heat. Thus the air entering the rooms behind the verandah is first cooled down to a considerable extent before it enters the room.

To secure comfort, verandahs on the South and West are indispensable, but if funds permit, they should be provided also on the East and lastly on the North. The latter is rather a luxury than a necessity. If exigencies of money do not permit to provide them on the South and West side, there should be one especially on that particular side on which the bed-rooms require protection from the heat of the afternoon sun, especially in summer. Not only are verandahs necessary on the ground floor, but also on the upper ones.

When a verandah is required only for mitigating the heat of summer, and not for the purpose of serving as a waiting-room, an excellent arrangement is to have a cheap structure built of wooden *ballies*, or posts, supporting a trellis above, on which is trained a vine creeper. The thick foliage which the vine gives forth in summer effectually excludes the sun and cools the hot breeze, and in winter, when its foliage is thin, it allows the warmth of the sun to be freely enjoyed. The vine has a luxuriant growth and if well manured and trained it would cover the trellis not only on the ground floor but on the first floor, also, in a couple of years, and would last for many years.

Verandahs are very often specially placed on the East or South-East, and so designed that they should be flooded with the morning sunshine, and afterwards, when the shutters are closed, the sun's heat is, to a certain extent, "trapped" inside. Such verandahs are called "Sun-traps" and are most enjoyable in a cold climate. The sun's rays have the power to kill all noxious germs and give a healthy and cheerful appearance and purify the air. For this purpose sometimes special "Sunbaths" are constructed in Western countries.

The use of the verandah as a waiting-room is very important. It serves the distinctive function of segregating the private apartments from the entrance area. A number of people will call on you. Amongst them, a few, like postmen, newsboys, pedlars, etc. will be met just at the entrance. There will be a few others whom you want to treat with reservation and formal courtesy and dismiss. They will not be admitted to the living-room. Even those who are welcome and whom you want to treat cordially, will feel embarrassed to find that they were interrupting the conversation of people already sitting in the room, if they were directly taken to the drawing or other private rooms. A verandah, in such cases, serves a very useful purpose.

If a verandah is designed simply for the sake of a passage or corridor,

giving an independent access to certain rooms, it need not be more than 3 or 4 ft. wide. Any width more than this for this purpose is a waste. If, however, it is to be used as a sitting-room or a waiting-room, its width should be $6\frac{1}{2}$ ft. as a minimum (although 7 to 10 ft. would be better), in which case one can conveniently spread a camp cot and loil on it whenever desired. Any intermediate width serves neither of these purposes satisfactorily, and hence is practically a waste. There is a disadvantage also from a deep verandah, inasmuch as its roof is likely to darken the room inside and make it look dull and gloomy unless rooflets (also called "gables") are provided.

A verandah more than 12 ft. wide is uneconomic. In order that a verandah should shade the walls of a building during the greater part of the day, it must not have openings of a height greater than two-thirds of the floor width. For a 12 ft. height it is 8 ft. and for a 9 ft. height, 6 ft.

Seven feet height of verandah near the eaves is suitable, for, it admits the maximum air and light at a low level, and affords shade and ventilation to inner rooms through apertures just below the ceiling level. If the depth of these apertures is restricted and length kept sufficient, they afford better ventilation and more light without admitting the sun's rays. Depth of aperture should be less than the thickness of the wall.

Projecting balconies which are also a sort of verandah, are useful, particularly when opening from a landing of a staircase. After winding up a few steps when one has got a feeling of slight exhaustion, these balconies serve as a resting-place where one can breathe fresh air and enjoy a view of the landscape, and are good in that respect. But when they stretch out from windows in private houses, particularly in an urban locality where houses are not far removed from each other, they do not serve any better purpose than an additional relieving feature in the elevation of the building, which adds elegance to it. It also protects the room inside from the driving rain, which purpose could be equally served by suitable bonnets over the windows. But this is secured at a sacrifice of a considerable amount of money for a small doubtful advantage. From another point of view, they do a positive harm to our neighbours. viz. they seriously interfere with the privacy of the neighbouring houses. No one would naturally like to be watched by his neighbours from a projecting balcony.

(2) Drawing or Living Room

Every cottage, whatever its size, should contain at least one spacious room, call it by whatever name you like, a "drawing-room," a "parlour," a "main or living-room" or a "lounge". Many and varied are the purposes served by it. The arrangement of furniture should be flexible due to the

large number of activities taking place there. Essentially it is a room for relaxation, where every member can lounge comfortably. It is also used as a reception room, and for holding social functions. It is required to be used as a dining-room on special occasions like marriage feasts, etc., or on holidays when a number of friends are invited to dinner. The drawing-room is required in small cottages for boys and girls of school-going age to study their home lessons. It is at times required to accommodate occasional guests who are never wanting in a middle-class Indian family. It is also required as a congregation room on occasions of some religious discourse or some such festivities, and so on.

The minimum size for a drawing-room should be 15 ft. \times 12 ft. But the size should better be determined by the kind of furniture needed. It is a mistake to determine the size first and then buy furniture to suit it. It should be well ventilated and lighted with large windows preferably starting from the floor level. The doors, especially the one at the front and the other at the rear, should have a minimum width of 3 ft. so that pieces of heavy furniture could be easily moved in and out. The position of heavy pieces of furniture such as tables, almyrrahs, suites, sofas, etc., should be invariably shown in plan and the position of wall cupboards, etc. should be accordingly fixed. This simple matter, if neglected at this hour, is likely to cause a great permanent inconvenience afterwards.

Placing of Doors: Placement of doors in a living-room (in fact in any room) is important. There must be sufficient unbroken wall surface for arrangement of furniture as illustrated below:

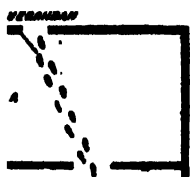


Fig. 10—Bad.

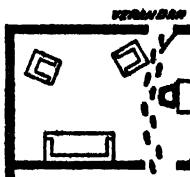


Fig. 11—Better.

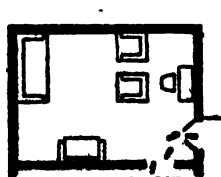


Fig. 12—Best.

Traffic path to, or from verandah limits the furniture arrangement. Windows in wall A (Fig. 10) cut up wall space, and no place for furniture is left.

Separate spaces should be allotted for different functions and groups of suitable furniture arranged accordingly, if the room is very large, e.g. a bridge group should have a bridge table and a minimum of four chairs, a music group formed by a nucleus of either a piano, a harmonium, or a wireless or television set, a writing group with a desk and one or two office chairs for writing letters, a conversation or smoking group with lounge chairs and

so on. Providing good lights and placing them to avoid glare is also of very great importance.

As regards the position of the drawing-room in an Indian home, it is best situated on one side of the house with an entrance from the front verandah. Amongst Europeans, it is usually placed near the front door. In that position it occupies a central place which, though convenient to the style of living of the Europeans, causes inconvenience in Indian families. It interferes with the free movements and actions of the ladies working in adjoining rooms. Amongst Mohammedan and some other communities, where privacy in an exaggerated form, viz. *Purdah*, is still in vogue, the drawing-room in a central position causes a positive inconvenience. It is also not adequately lighted in that position by light borrowed through verandahs.

Mouldings of any sort, even cornices and skirtings on the inside of the drawing-room, or, in fact, of any room, to give a decorative effect should be scrupulously avoided as they present an ideal breeding-place for germs of disease. The picture-rail, too, is better forgotten.

As far as possible, pegs should not be fixed into the walls at random, some clothing or other is bound to be hung from them, which looks unseemly. If necessary, a set of a few pegs should be fixed to the wall in a corner for the purpose.

A skirting of polished slabs or cement tiles, or at least a coat of black japan, coal-tar, or a paint of dark chocolate or slate colour, a foot wide all round the wall above floor, not only looks well, but is sanitarily good and allows the floors to be freely washed with a disinfectant in water without staining the distempered surface. This is applicable to bed-rooms also.

The modern trend is to prefer an outdoor open living-room to a close, congested indoor one. The floor may be either one carpeted by Mother Nature, in the form of a formal or informal lawn, or man-made paved terrace, or even *murum* or mud floor which is serviceable for at least eight months of the year. It should, however, be invariably enclosed either by one or two rustic walls of brick or stone, or hedge-rows or shrubbery, so as to afford privacy from both the public gaze as well as the neighbours. With a ceiling of the sky and a shelter either of a tree or trellised vine for protection against the hot sun, with flowers, foliage and pleasant vistas as pictures, such an outdoor living-room is most exhilarating amidst a cool breeze, even for dining purposes.

(3)

These are the most important rooms in a house. One spends more than one-third of his life at rest in sleep here. Amongst Europeans two

persons are commonly supposed to occupy one room without constituting a case of overcrowding. Thus if there are 5 or 6 persons in a family, they require a house with three bed-rooms.

It is a pity that on account of the poverty of the people and their ignorance of the importance of ventilation, little or no attention is paid in India to this most vital question. In many places, especially among the poor classes residing in villages, the number of occupants in a bed-room is determined by the possible number of mattresses which could be spread on the floor from wall to wall in the room. Four, five, or even more persons are in the habit of sleeping in it. Of course, in many parts of India cots or *charpois* (four-legged coir-matted wooden cots) are a luxury which even the middle classes cannot afford. In farmers' huts, even young calves and dogs are allowed to occupy a corner of the same room. The one or two small windows (if such holes in the wall deserve the term) that there may be in the walls, are also closed for fear of draught.

Many of the rooms are occupied by more than one family! Before the War the rent of these rooms ranged from Rs. 10 to 12 per mensem in Bombay; the average monthly wages of this class were Rs. 30 per mensem. The results of all this could be very well imagined. The low vitality, the very high death-rate, anæmia, tuberculosis (particularly in females), and high infant mortality, etc. are all directly attributable to the overcrowding in bed-rooms. The farmers who have to work all day in the open field, get pure air by day and thus have this relieving feature partly to compensate for the overcrowding in bed-rooms by night. But the mill-hands and other labourers who have to work the whole day in an atmosphere congested with smoke, and who do not get a chance to breathe in free air even by night, fall an easy prey to disease. In old times, agriculture was the main industry of India, which required the majority of people to do work in the open air, and that preserved their health. In this industrial age, people are leaving agriculture behind them in the villages and are flocking to industrial centres in cities, which have attracted large numbers even from the middle classes who follow pursuits of a clerical or other allied nature. Men go out of doors during at least a part of the day, but women have to spend all their time at home doing domestic work, which has resulted in lowering the general standard of vitality amongst them. It is futile to expect that the children born of such mothers, who are the future citizens of India, would be strong and healthy. Therefore, if India wants to live amongst the nations of the world, she must solve this problem of housing the middle and working classes satisfactorily, and the sooner she does it, the better.

The minimum window area, required by the municipal bye-laws, is

one-tenth of the floor area. But the minimum should always be more than one-tenth. In domestic buildings, a minimum of 350 cubic feet of space for an adult and 200 cubic feet for every child under ten, should be made while designing bed-rooms. Besides this, a suitable allowance should be made for every piece of furniture. However, the quantity (square feet of window area) and quality (cross and through openings) of ventilation are of greater consequence than either the floor area, or the cubic space allotted per head.

The above considerations will give some clue as to the size of bed-rooms. From a practical point of view, 15' \times 12' has been found by experience to be a good size for a bed-room in the houses for the middle classes.† As has already been stated, an oblong room is more convenient, particularly as a bed-room, than a square one, and that no room should be less than 100 sq. ft. in floor area.

Bed-rooms should be placed on the side of the direction of the prevailing wind, and if this happens to be West, the wall on that side should be protected from being heated by the sun's afternoon rays by the provision of a deep verandah on that side. The ideal conditions are that the sun should shine in the bed-rooms for some part of the day, preferably in the morning, and a free breeze should ventilate it by night.

A small bath-room combined with a dressing-room attached to bed-room, is more or less a modern necessity in the houses of the well-to-do. However, in small cottages, it is desirable to so arrange the bed-rooms that the services, viz. bath-room and the w. c. are easily and independently approachable from every bed-room. In the designs given in the following pages, a special attempt has been made in this respect.

Some storage space is absolutely essential in bed-rooms. Portable wardrobes not only occupy some floor space and the cubic content of the room, but it has a top surface which collects dust. Besides it is difficult to keep the cramped space below and behind the wardrobe clean. A cupboard built into the wall is free from all these disadvantages, besides being cheaper. One or two such built-in cupboards in places where they would not come in the way of beds are very convenient. A chest of drawers also could be provided, built into the wall below such cupboards.

Another and still better arrangement is to construct a hollow wall of plywood or similar material to serve both as a partition wall and a closet, one such closet could be provided on either side in each bed-room. This is a very

† But if there be efficient cross ventilation through fan lights, even though the doors and windows may be closed by night, a smaller size would do for a bed-room.

common practice in Japan. The rooms in the Japanese houses are literally empty. All their things, including clothing and even bedding, are stored behind these sliding partitions which are often of paper. The Americans have copied this. The closets are sometimes built not in walls but independently in a corner of the room, where if their depth is sufficient, they serve also as dressing-rooms. Details of such closets are given elsewhere while discussing storage space.

While planning bed-rooms, first determine the position of the bed with respect to the windows, so that the bed would be in the path of the cross air currents. In India draught need not be so much feared as in the cold countries. At the most, another position for the bed may be thought of for winter, away from the direct breeze. Other requirements are that the door should be so located that when open, the bed will be screened rather than exposed. A single-leafed door is thus more suitable in bed-rooms. Further, there should be adequate space for the bed-room furniture such as a chair, dresser, small table, etc.

The master's bed-room should be spacious enough to accommodate a double bed or twin single beds and, if possible, it should have its own bathroom.

Children of different sexes above ten should preferably have different rooms, one for the boys and one for the girls. Both these rooms, particularly the girls', should be close to the parents'.

(4) Dressing-Room

A dressing-room necessarily requires to be attached to the bed-room. Its size will depend upon the use intended for it—whether purely for dressing or also for secondary purposes (boudoir, study, hobbies, etc.). The main requirement is that there should be ample light. Whether it is daylight or artificial, it should be so placed that it lights the body and not the mirror, as is very often wrongly done. If it be electric or other strong light used at night, it should not come within direct vision so as to cause a glare, but should be diffused. The furniture required in the dressing-room is a dresser or chest, dressing-table with a mirror and a chair.

(5) Kitchen

The kitchen is a very important room in the house, because on the cleanliness and the quality of the food that is prepared therein depend the health, comfort and happiness of the family. The improvement particularly

in respect of its planning has now reached its peak with laboratory efficiency in western countries. Space has been contracted to a minimum of 5 or 6 ft. between two long walls of working area, with the *chulla*, (or the stove), sink, tiled working surfaces, a continuous line at a uniform height, for economy of space, time, and labour. The mistress or the maid standing in the centre of the small kitchen can reach the various things and equipment arranged around the walls on tops of tables and in rows of cabinets provided with trays, drawers, and shelves, etc.

Why should we not have a similar arrangement? Our kitchens at present are the very embodiment of drudgery. Firstly, our cooking range rests on the floor, in which position it does not get any draught of air from the bottom. The result is that a lot of smoke is caused. Usually there is no outlet provided for the smoke and where it is provided, it is not based on scientific principles, with the result that the smoke not only spreads in the whole house and darkens everything it comes in contact with, but oftentimes, if the kitchen is not properly oriented, it enters the eyes of the housewife squatting in front of the *chulla* and makes her drudgery still worse.

Then, again, cooking is done in a squatting posture, which, if continued for a long time, results in pain to the back or loins. For reaching every little thing, the lady has to get up every now and then as there is very little storage space compared with the modern Western kitchen; she has to make unnecessary trips to and fro. Even the sink is not close by to be reached easily from her sitting-place.

Cooking in a standing position, on the other hand, simplifies everything. It necessarily requires the *chulla* range to be installed at a higher level, which allows easy draught of air from below even if firewood is used for fuel. This arrangement affords a considerable cabinet space below the range, makes the sink very easily accessible and increases the storage space enormously, because cabinets can be arranged all around up to a height of 6 ft. There is a further great advantage in this arrangement, viz., it minimises the risk of the saree catching fire—a tragedy of too frequent occurrence in India which takes a heavy toll of life every year.

An ideal kitchen suitable for our conditions and manner of living should be planned on the following basis:

(1) *Location*.—Eastern or N. E. corner is the best. It will be pleasantly warmed and its air, purified by the morning sunshine entering it, would remain cool during the other part of the day. If located there, it would obviate the smoke trouble also.

(2) *Equipment.*—*Chulla* range, cabinets for storage, sink, work-table, water-storage (where there is no continuous piped supply), and garbage bin are the main equipment, and a refrigerator, in addition, in the homes of the well-to-do.

(3) For practical planning go through a day's duties, and learn the order, in which each process is performed. The trips between the *chulla* (or stove), sink, working surface, and refrigerator may be studied, and the units arranged so as to eliminate unnecessary steps, and provide greatest convenience.

(4) Arrange the furniture in your plan, and make sure, that plenty of space to move about is left. This will indicate the minimum size. The shape of the room with placing of the doors, windows, built-in features etc. is of the first importance.

(5) *Lighting and Ventilation.*—Light should enter the kitchen in two directions. The window space should be a minimum of 15 per cent of the floor area and the outlook through the window should be cheerful. If Nature has not provided a cheerful view, it should be done artificially by planting a few flowering trees or seasonal plants or at least a few flower pots placed just outside the windows, so that the housewife should not feel cooking a drudgery. There should be cross ventilation provided. The number of doors should not be more than two.

(6) *Floor and Wall Surface.*—The floor should be paved with a smooth, grease-proof material which should remain clean and should be easy of cleaning—polished flagstones are the best. Cement tiles are likely to be stained. Concrete floor, polished smooth, (Indian Patent Stone) is also good and cheap. The joints, if any, should get filled flush with the surface so that nothing collects inside them.

The lower three feet surface of walls should be very smooth, and if not tiled, should be given two coats of paint. The junction between the walls and the floor should be coved or at least rounded. A suitable slope should be given to the floor surface towards a drain pipe of at least two inches diameter for facilities of washing.

(7) *Storage Space.*—As much storage space should be provided as possible in the kitchen. A very convenient space would be in the form of cabinets above the level of the table. They should be of a smooth material with close fitting shutters and detachable shelves. The depth of cabinets should not be more than one foot for convenience. The space below the level of the table should be utilised for storing heavy articles, such as jars of pickles, flour bins, large utensils, etc. Even the space above the cabinets up

to the ceiling should be utilised for storing articles which are only occasionally required.

(8) *Smoke Outlet*.— Whatever kind of fuel is burnt, except electricity, a smoke outlet is necessarily required. A suitable scientific design is given in the author's *Build Your Own Home*.

Details of Equipment.—(a) *Chulla Range*. This will depend on the fuel or heat energy used—electricity, coal, coke, gas, charcoal, fire-wood. But in all cases, it should be on a raised platform about two feet above the floor level.

(b) *Storage of Water*.— Where there is no continuous piped water-supply, water must be stored. This should be at a level a little above that of the sink, and if possible, a pipe should be led from it to the sink.

(c) *Sink*.—This should be of a very smooth material—porcelain, stainless steel, enamel, etc., as far as possible without joints. The walls adjoining the sink should have a lining of glazed or polished tiles about a foot high in the portion where water is likely to splash. There should be drain boards, preferably two, one on each side, one for the soiled and the other for the washed utensils. A dish drain, towel rack, a shelf or a recess for scrubbing material, a soap-holder, etc., should be provided for.

(d) *A Garbage Bin*.—This should be below the sink, with smooth surface on the inside, preferably of metal with a close-fitting lid at top.

(e) *A Preparation Table*.— Preferably with plate glass top with a chopper, grinder, cutter, etc., attached and a drawer for knife, spoons, etc.

Other articles of equipment are an armless chair or a light stool, a clock, and a number of cabinets—amongst them one for milk and other dairy products and the other for fruits and green vegetables. These should have shutters of fine wire mesh to exclude vermin and provide ventilation. If these cupboards are in a wall exposed to outside, a few air bricks† in the wall would provide efficient ventilation.

Every precaution should be taken to exclude flies from the kitchen, such as providing fine wire mesh, spring shutters to the doors, etc.

A convenient plan of a kitchen embodying the above features, is shown in Fig. 13.

† Air bricks or porous bricks made of sand and cement in the proportion of 8 to 10 parts of sand to one of cement.

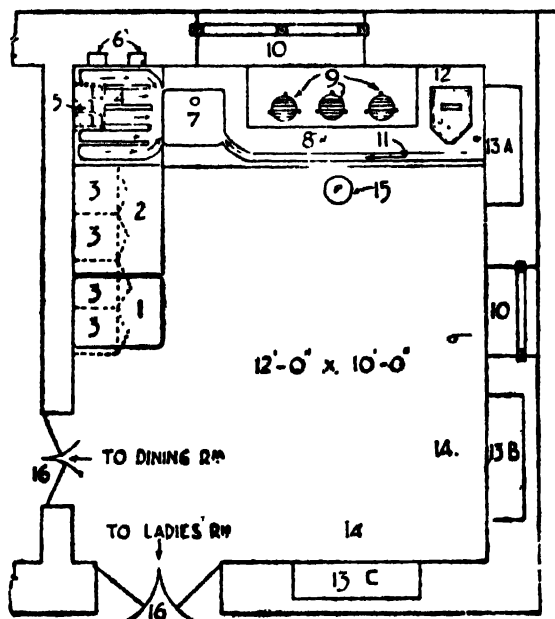


Fig. 13

1—Refrigerator. 2—Two ft. wide table, 2 ft 6 in. high, with stainless steel or g.i. plain sheet top. 3—One ft. deep cabinet, fixed to wall, 1 ft. 9 in. above table. 4—2 ft. \times 1 ft. 6 in. asbestos cement corrugated drain board slightly inclined towards sink. 5—Steel rack for china or other plates, cups, saucers, etc. at 4 ft. 6 in. level. 6—Small niche for scrubbing materials, such as soap, ashes, loose coir, etc. at 4 ft. 6 in. level. 7—1 ft. 9 in. \times 1 ft. 9 in. glazed tile-lined sink, one ft. deep. 8—4 ft. \times 2 ft. chulla platform at 2 ft. 5 in. height. 9—A pair or three chullas. 10—Glazed window, 11—15 in. wide space in front of chullas with a slope towards sink for rolling chapatis, etc. 12—Space for flat stone for crushing spices, rolling pin and other equipment. 13 to 13B—Wall cabinets: 13A—For salt, spices, oil, etc. 13B—For milk, butter, and dairy products. 14—Space for 2 or 3 school going children's early meal. 15—Stool or armless chair. 16—Doors with wire mesh shutters to prevent flies from entering. Space below chulla platform for storing coal, Barshane cylinder, and a bin.

(6) Dining-Room

If the kitchen is scientifically planned, even a verandah on the rear side closed with a dwarf wall three feet high and a trellis work above, will serve the purpose of the dining-room in small cottages. When a separate dining-room is to be built, it should be located as near the kitchen as possible to save unnecessary walking. Provision of one or two cupboards and a wash basin in a corner for washing hands after meals makes for great convenience.

If dining is done in the orthodox manner while squatting on the floor, a minimum width of 8 ft. is required for two rows of diners facing each other, with adequate gangway between for the server. The modern trend in

the better class homes is to use a table and chairs for dining. A better way, which is the golden mean between the orthodox and the modern ways, is to use dining-table of 18 inches width in two rows, with a gangway of about $2\frac{1}{2}$ ft. between for the servers. A width of 18 ins. is sufficient for the plate and bowls used for an Indian dinner. These tables could, if required, be joined together and used as a single central table also. In that case a width of 9' 6" or 10' will suffice.

For informal daily family meals the greatest economy of space could be made by providing a counter 18" to 21" wide at one end of the kitchen, and arranging round stools beyond it for seats, facing the kitchen, as is almost universal in American restaurants. The housewife can serve meals from the kitchen in the plates on the counter. This arrangement is illustrated in the view of the kitchen/dining room in the plan of the "House of Nine Parallel Walls" given later on in this book.

If plate glass or polythelene plastic or polished asbestos cement sheet is fixed on the top, a table-cloth may be altogether dispensed with. The above are very clean materials and save considerable labour, and if a paper with colourful floral design is laid below the glass, or transparent plastic it creates a cheerful atmosphere in the dining-room.

The windows of the dining-room which should be large, should have large panes. The out-door view should be pleasing to the eye—either natural or artificial, made by suitable landscaping.

The floor should have a very smooth and non-absorbent surface, capable of being easily washed.

In small cottages the dining-room, though small, serves many useful purposes. It is the main sitting-room for the ladies, it serves as a children's play-room, also for doing their home lessons, as a room for the girls to practise music, and so on. Hence it is desirable that it should be well-lighted and ventilated and should command a good aspect.

However, in the comparatively large houses of the upper middle class families, as there are separate rooms for the above activities, the dining-room is not much used except for dining, and, therefore, may be reduced in size, particularly if there be an open terrace in front properly screened by means of a hedge or creeper and shaded by evergreen trees. Dining in the open air has its own charms and may be enjoyed at least during eight months of fair weather.

Combined Living-Dining Room: With the reduction in size of the average family house, most home-owners have come to realise that a separate dining room, which is used only an hour or two a day, is a luxury which

middle class people cannot afford. A combined living-dining room is the solution. It increases the usable space of the room, whether used either for dining or living. It has the added advantage of eliminating formal dining suite, by substituting a table and light chairs and providing built-in storage for linen, crockery and silver. Another advantage is that the partition or screen, used for division of the room, provides extra unbroken space for furniture in the living room.

For separating the dining space from the drawing room, sometimes, an archway is provided, carried to the ceiling. (See Fig. 14.) The best way is to make the division by means of a low, removable or folding partition, Venetian blind, glass partition, go-down shelf (with its face on the drawing room side covered with a cloth or hardboard,) curtain, or even plants or vine. Their low height makes the larger expanse of ceiling visible, which is a major factor in increasing the apparent size of the room. (See Fig. 15.)

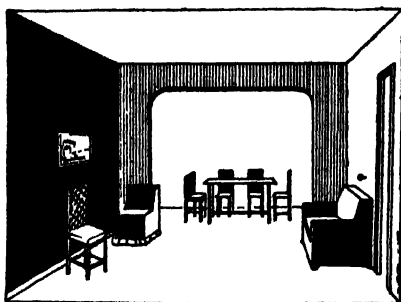


Fig. 14.

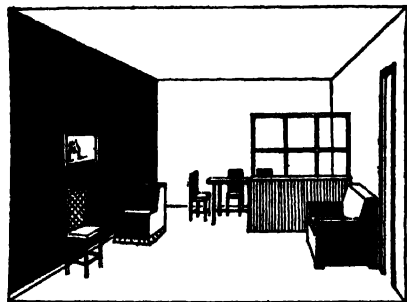


Fig. 15.

Fig. 14: The arch carried to the ceiling has resulted in cutting the already small living/dining room into two smaller rooms.

Fig. 15: In contrast, the low partition, by exposing the ceiling line running through has given the appearance of much larger space.

A living-dining room combined may prove embarrassing when strangers call during dining hours. But if the space allotted to dining is on one side, a little removed from the main entrance, even just a cloth curtain would provide sufficient privacy. If a folding partition is used, its leaves should fold flat against the side walls.

There are many possibilities of combining a living with a dining room. Many of them are shown in the plans that follow these notes. Such small spaces attached to living rooms are called "dinettes."

A drop-leaf table is very convenient. This is shown in Figs. 16 and 17. There is a central box with drawers, one above the other, and to the top

are hinged thick ply-wood boards on both sides with folding frames hinged at bottom. These can be folded as in Fig. 16 or opened for the extension if a number of guests are to be entertained. (Fig. 17.)

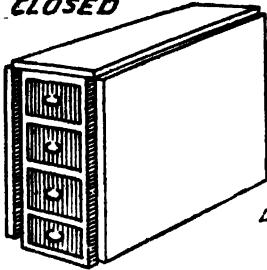
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Fig. 16.

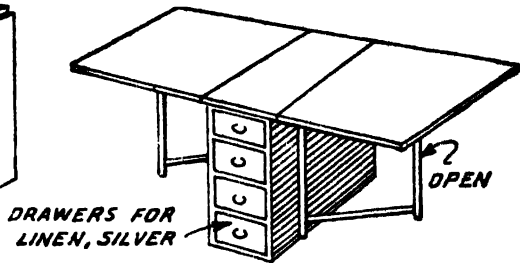


Fig. 16—Folded drop-leaf table.
Fig. 17—Drop-leaf table opened.

Fig. 17.

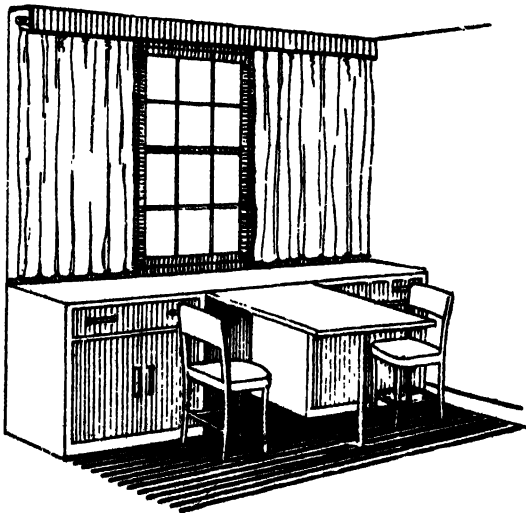


Fig. 18.
A multi-purpose table
at end of wall.

Another good idea of a drop-leaf table suggested is shown in Fig. 18. This useful feature at the end of a living-dining room can be used for meals for two, studying, writing, sewing, etc., and when not required, the leaf can be folded to form a hollow space for temporary storage.

(7) A Ladies' Apartment

By far the largest part of the day is spent by the ladies and young children indoors. The active man, whose duties for the greater part of the

day call him out of doors, soon forgets his fatigue and has his strength for renewed activity more thoroughly restored where a healthy home awaits to welcome him. For those who have to spend more time indoors, either through duty or necessity, the greatest care in all the details of a wholesome dwelling are most essential. The strong man, after free respiration in fresh air out of doors, may pass with immunity through foul or damp air, or sit for a considerable time or even sleep in a close, dingy room. But such is not the case with those who stay at home. Delicate women, youth susceptible to illness, and tender children suffer most.

Then, again, the ladies' apartment is, in most cases, likely to be the lying-in room of the mother or the child's first nursery. All the requirements, therefore, such as sufficient direct sunlight, equable temperature, sufficient air space, with means of constantly renewing the air—requirements which make for health and comfort—should be provided in full measure in this room.

(8) Store-Room

This room or pantry is also a necessity in houses for the middle classes. In very small cottages, roomy wall cupboards and a loft, either in the kitchen or in the dining-room, serve the purpose of a store-room. One or two underground cupboards (described on page 54) would be very much appreciated in small cottages in particular. The store-room should, as far as possible, be situated near the kitchen and should have a stone paving so as to preclude the possibility of rats entering and making their home there. Rats not only do a lot of damage, but also carry on their body the potential danger of fleas affected by plague. The store-room should be well lighted and ventilated, and there should be a row of shelves all round. The lowest row should be at least 9 inches above the floor level so that the floor could be easily cleansed and washed of all dirt. For an ordinary family a store-room of about 10 ft. \times 6 ft. should be adequate enough.

In rural districts a bigger store-room is required to store staple food-grains, etc., which are available at a cheaper rate during the harvesting season. Besides, a fuel room or a coal cellar, spacious enough to store fuel sufficient for the requirements of the four months of the monsoon season, is required in addition.

In addition to this, some space for putting bicycles or a perambulator is very often required in the cottages of the middle-class people. A corner of the front verandah or the space below the flight of stairs is suitable, if the latter be situated not far from the front entrance.

An efficient home must have not only "a place for everything" but also "everything in its own place."

The houses of the traditional type provided a very large space—a big hold-all—both in the basement floor and in the attic or just beneath the sloping roof where one could dump anything and everything—the heavy things could go into the cellar and the lighter ones into the attic. But the modern trend disfavors close and dingy cellars and the flat roof of modern houses deprives us of the attic space also, and hence the problem of storage space arises.

With normal families, there is always a heap of lumber, which, though not quite useful, is not quite useless either, and cannot, therefore, be thrown away—some storage space has to be provided for it. Normally, when we begin to plan a store-room, we have before our eyes the storage of provisions such as wheat, rice, tea, sugar, charcoal, etc., and that is all. In urban districts, the purchases of the provisions are made weekly (or sometimes monthly) and, therefore, a large store-room is looked upon as a waste of space and money. But if we sit down to make a list or an inventory of the things we have actually stored in our house, we shall be surprised to see how many and how odd they are—things which we never dreamt we ever possessed!

Even if we take scrupulous care in eliminating things from time to time as they go on accumulating, still there are a number of things which must legitimately find a place in the home. Here is a small list which is by no means exhaustive:

(a) *Articles of the nature of clothing*

such as overcoats, raincoats, umbrellas, washed and soiled linen, rugs, quilts, bed-sheets, towels, canes, hats, shoes, boots, slippers, sandals, and the entire clothing—formal and ceremonial—both of the males and of the females.

(b) *Articles of the nature of foodstuffs and provisions*

such as wheat, rice, cereals, and other staple food-grains, tea, sugar, condiments, fruits, vegetables, dairy products, meat, eggs, soaps, oils, charcoal, kerosene oil, bread, butter, etc.

(c) *Articles of frequent use requiring a special storage*

such as family medicines; sports equipment, such as tennis or badminton racquets, fishing tackle, golf-clubs, polo or hockey-sticks, guns, etc., children's toys; disinfectants; house-cleaning equipment such as brooms, brushes, mops, vacuum-cleaners, etc.; daily and special Pooja equipment; china; glassware; toilet equipment; tools and implements; utensils and cooking equipment of daily and occasional use, etc.

(d) *Articles of value*

such as jewellery, costly ceremonial dresses especially of the ladies, silverware, etc.

(e) *Heavy and bulky things*

such as cycles, perambulators, tents, sewing machine etc.

(f) *Articles of the nature of "dead" storage*

such as furniture and utility machines needing repairs, travelling equipment trunks, cabinets, etc.

(g) *Surplus stock*

such as pipes, fittings, books, furniture, screws, nails, pegs, tools, etc.—things not immediately useful but with which one is loth to part.

Definite allocation of storage space must be provided for all the above while planning a home. Those requiring frequent use must be within easy reach.

It is not practicable to state here with precision where and what sort of storage space should be provided for each of the above items. That depends upon several factors such as individual habits, accommodation and nature of plan and so on. It is therefore, proposed to set down here in a general way the possibilities of providing storage space in a home.

Recently the smaller size of house does not permit a separate store room. The storage space is distributed in all rooms wherever possible.

In the kitchen a number of built-in wall cupboards or pre-fabricated removable cabinets could be provided. If cabinets are provided, they should be arranged all round the kitchen, leaving a space in front of windows only. Shelves, trays and drawers could be arranged inside these cabinets.

A large closet preferably with sliding shutters in the entrance or verandah with a shelf with holes for canes and umbrellas, hooks and hangers for overcoats and raincoats, and shelves at the top inside the closet for hats and a mirror in a suitable place. (This arrangement is far better than the traditional hat-stand.) A similar small cabinet about two feet high should be separately provided inside, but near the entrance, for shoes, sandals, etc., at floor level.

A steel or wooden stand for bicycles should be provided in the motor garage. The space below the staircase should be suitably enclosed and utilised for articles of "dead" storage, and if the staircase is near the entrance, even bicycles and a pram could be stored there below it.

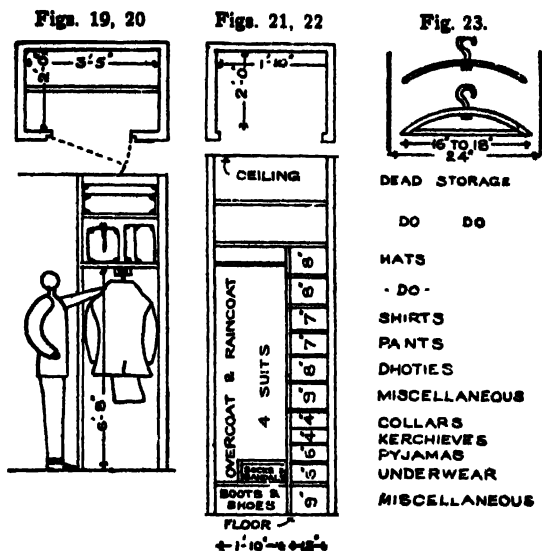
A loft should be constructed on the top of the garage at a height of 7 ft. above the floor level. This would provide considerable storage space.

A small pantry adjoining the kitchen is very handy as a provision store. A go-down shelf, 6 ft. high, separating dinette from living room could serve the same purpose.

Lofts could be built at a height of 7 ft. above bath-rooms and w. c. and passage also.

Built-in wall cupboards could be provided below windows up to the

floor level, and if the shutters are of a sliding type, they would not interfere with the carpet while being opened.



Similar built-in small cupboards are possible above the doors up to the ceiling for "dead" storage.

Underground cupboards of a small capacity—say $3' \times 4' \times 1\frac{1}{2}'$ deep could be provided in the passage in the centre of the pantry with wooden

hinged shutters flush with the floor for storing charcoal.

Closets of plywood or similar material should be provided in lobbies and every odd corner or a recess that would be available, for accommodating trunks and suitcases at the bottom and family linen, such as bed-sheets, pillow-cases, towels, dusters, napkins, etc., on shelves.

Similar built-in closets for clothes should be provided—two in each bed-room, even at a small sacrifice of some space out of the bed-room, which considering the convenience they afford, is no sacrifice at all. These closets would altogether obviate the necessity of several fittings in the bed-room, such as shelves, racks, pegs, etc., and if judiciously planned, would serve as sound-proof partition walls as well.

Figs. 19 to 23 show such closets suitable for bed-rooms. The coat-hangers shown in Fig. 23 on the right-hand side are usually 16" to 18" long. So one measurement of the closet (either depth or width) should be minimum 22", if not 24". The closet on the left-hand side (Figs. 19 and 20) is 24" at right angles to the face of the wall and 3' 5" wide. The space for overcoats and coats is 6' 8" high and above that are two rows of shelves up to the ceiling for storing travelling kit. Figs. 21 and 22 show another closet with the door removed to show the pigeon holes for storing details of clothing.

(9) Worship or Prayer Room

Of late, very few people can afford to devote a special room for this purpose especially in cottages in an urban area, for many reasons. The chief amongst them is that one finds very little time for this purpose in the midst of a modern busy life. Secondly, space is very much restricted; and thirdly, there is paucity of funds for building on any more area than what is absolutely necessary. In the up-country places conditions are more favourable. There is plenty of leisure; site is unrestricted in extent, and the building materials and labour are comparatively cheaper. If provision for this room is desired, it should be situated in a secluded part of the house, free from disturbance of any sort. It should be well ventilated and lighted, but there should be an arrangement to make the room partially dark when required. Slight darkness, particularly combined with seclusion, tends to increase the solemnity which is very much desirable in this room for inducing concentration of mind. An alcove in the dining-room would be quite suitable for this purpose.

If a small special room is to be allocated for this purpose, it should be on the ground floor and not far removed from the kitchen or dining-room, because in the midst of the busy modern life, the duty of the *Pooja*, except when there is a retired member in the family, is relegated to the ladies, who have more time to spare and who are also more religiously minded by nature.

Apart from this space some other quiet, secluded place is normally required in a home for reading, for attending to work brought home from office, and sometimes for discussing some private personal matters between any two members of the family; or for interviewing an unexpected visitor who, ushered in, amidst friends or guests being entertained, would feel embarrassed and might also interrupt the mirth and pleasure of the party. A library or a study-room is very convenient for this purpose. But in the absence of either of these, just a small enclosed corner or alcove in which two men can comfortably lounge, will be sufficient.

(10) Bath-Room

The main bath-room should be on the ground floor not far removed from the kitchen. If a hot-water boiler is to be kept in the bath-room, a minimum size required for it is $6' \times 10'$. If used only for bath purposes $5' \times 8'$ is a sufficient and convenient size. There should be two windows in a bath-room—one for ventilation, situated at a height of $6\frac{1}{2}$ ft. above the outside ground level and another at the usual low level with frosted glass shutters for admitting light but maintaining privacy. It is convenient in small

cottages to keep the ceiling height of the bath-room low (say about 7 ft.) and to provide a loft above it for storing fuel or any other articles of lumber. The loft should be well lighted and ventilated, and it should have a hinged door of expanded metal to keep rats out.

The Indian way of taking a bath requires some part of the floor (say, 3' \times 3' preferably that in a corner) to be lower in level by about 3 inches than the remaining and a smoothly dressed stone 15" \times 15" and about 6 inches high, fixed in the centre for squatting, while taking a bath. The entire floor of the bath-room should have a flooring of polished flagstone slab, and walls all around should be lined with glazed tiles to a height of at least 3 ft. or, if its cost be found to be prohibitive, the floor should be paved with flagstone and the sides with cement plaster coated with a durable and hard-surfaced paint. As far as possible, lime in the form of mortar or calcareous composition of flagstones, should not be allowed at least in the sink or lowered part of the floor, as urine, which contains an acid, acts chemically on the calcareous matter, and unless copious water is poured for flushing immediately after use, it causes a bad smell and also wears the stone away. Even trapstone paving is preferable in rural districts, though from a sanitary point of view a smooth surface cannot be obtained on it so easily. A *nhani* trap should be fixed in the bottom of the sink towards which the floor should slope. In no case should water be allowed to stagnate near the house. It causes not only damp, but also breeds mosquito larvae.

The provision of a corner-shelf at a suitable place for keeping a soap-box, a towel rack, another shelf 9 inches above the floor level with perforations for draining off water from wet and soiled linen, a shower-tap, if feasible and necessary, and hooks or a set of pegs for clothing make the arrangements in the bath-room complete.

Whether water is heated in a boiler or in an open copper pot placed on a *chulla*, a smoke outlet is a necessity; still to preclude the possibility of the smoke entering the house, the main bath-room should be located in a place opposite to the direction of the prevailing wind, and should have no ventilators over the doors, opening into other rooms from the bath-room.

Though a bath-room attached to every bed-room is a luxury which only the rich people can afford, there should be, in addition to the main one, a common bath-room, which guests and other occasional visitors could use without encroaching upon the privacy of the family. If bed-rooms are located on the first floor, there should be a bath-room also there with an independent passage to it from each bed-room.

The additional bath-room on the first floor near the bed-room is rarely used for bathing purposes in middle class Indian families, for which

the general bath-room on the ground floor is normally used. However, it is advisable to provide all the bathing facilities also here for use when a rush is expected on the general bath-room on account of the arrival of a number of guests. This should, however, be essentially planned as a toilet-room and should have, besides all the toilet requisites, a white glazed urinal in a corner. It is a bad practice to use the sink in a bath-room for this purpose. There is a pattern of a urinal in the market embodying flushing arrangement which is very suitable only for Indians and useful for both males and females.

It is a mistake to include a w.c. inside a bath-room unless the latter is only for individual use attached to a bed-room. It should always be in a separate closet or compartment with an access independent of the bath-room.

In the interest of economy, the bath and toilet rooms on the upper floors should be located on the top of those on the ground floor, and those on the same floor should be grouped together and not placed away from each other. This arrangement saves a considerable length of drainage pipes and inspection chambers.

A bath-room serving several bed-rooms should not have doors opening into different rooms, but there should be one door only opening from a common lobby.

The door shutter of the bath-room should be so arranged that when open, it would screen the space where the actual bath is taken.

(11) Staircase

The staircase is the main thoroughfare of intercommunication between the floors and, as such, is of very great importance. But, generally, there is a tendency for people to effect all the economy of space in this particular respect at a sacrifice of considerable comfort and at a risk of frequent accidents. If the upper floor is exclusively devoted to bed-rooms, the staircase could be located at any convenient place inside the house. But, if some of the rooms on it are to be used as sitting-rooms as well, which outsiders may occasionally visit, the position of the staircase must be such as will afford it an entrance independent of the other rooms on the ground floor. That is why many people like to post it in the front verandah. If it is situated in the latter place, another staircase on the rear side for the use of ladies will add much to the convenience and privacy of the household.

In order that a staircase may be comfortable it must satisfy the following requirements:

- (1) It should be airy and well lit.

(2) The stairs should be easy and comfortable. There are two rules for guidance to determine the mutual relation between the tread and riser;

(a) Tread (or the width of the foot-rest) \times riser (or the height of the step) = 66 inches.

(b) Tread $+ 2 \times$ riser = 23 to 24 inches.

Note: The limiting dimensions are that the riser or height of step should never be more than 8 inches, and the tread or the width of the foot-rest never less than 9 inches. 6" riser and 11" tread are very satisfactory dimensions; 6½" and 10" are the next best. These will be appreciated by old people and invalids who find stairs in general difficult to negotiate.

(3) There should be at least 6½ ft. clear headway above any step.

(4) The width of the stairs in a winding flight should be at least the same as in the straight one.

(5) The stairs should be sufficiently wide (3½ if not 4 ft.) so that two people would be able to stand abreast comfortably and pass by each other. It also easily permits pieces of heavy furniture to be carried to the upper floor. This precept, however, in Indian cottages, is honoured more in the breach than in the observance. Three feet clear inside the railing is the minimum width required even in the smallest cottages.

(6) As a rule, a staircase should not have triangular or winding steps at all. Not only do they tax the ingenuity of carpet layers, but they cause positive harm. Firstly, people going down the stairs are much more likely to slip on the "winders" than on the straight steps, and secondly, if they slip, they fall down a large number of stairs, which is likely to make the fall a serious one. Young children are very susceptible to this in particular. It is therefore prudent to leave no chance for possible risks by spending a few rupees more and altogether avoiding winders *even at the sacrifice of an easy rise*. If for exigencies of space they have to be there, they should be rather at the beginning of the flight near the ground, so that, if a fall does occur at all, it would not be a severe one.

(7) As far as possible the height of the risers should be uniform. A difference of even ½ inch in the height of one single step, though not quite apparent to the eye, is at once susceptible to one's legs and causes one to become startled and perhaps to stumble.

(8) Each flight should have not less than three steps at least, and as far as possible, the number of stairs in each flight should be uniform.

(9) The staircase should, as a rule, be fire-proof, especially if there be only one.

(10) Not more than ten steps should come together in one flight,

otherwise the climbing becomes tiresome. But this may not always be possible.

(11) A staircase just in front of a house gives a poor appearance. Aesthetically, a geometrical staircase (one having three or more flights at right angles to each other, or winding but square) is good. It also affords easy facilities for lighting and its "well," or the central hollow portion, forms a good position for a lift. But it involves a danger in case of an outbreak of fire, as it provides an air chamber and a sort of chimney which causes the conflagration to spread. Moreover, it totally blocks the descent under those circumstances. A winding staircase, if centrally situated in a house, affords the best means of ventilating the house, and simplifies air-cooling.

(12) As far as possible, the staircase should start in a separate lobby even though small.

(13) The railing should be quite simple in design so as to facilitate cleaning. A dwarf wall at least 3 ft. high, of brick or concrete, or, at least of wooden framework with ply-wood panels, is attractive, simple and economical.

In flats and tenement houses in particular, unless there is a separate emergency exit, the staircase should necessarily be fire-proof.

In large houses a separate staircase, although a cramped one, with its upper landing in a lobby for the use of servants is necessary.

(12) Comfort Room

You may be strong and stout, and your entire family enjoying excellent health at the time of building your house; but you should not lose sight of the rainy day too. There is every chance of yourself or some of your family falling sick some time in the future. Again, it is likely that there might be some aged or infirm person in the house dependent on you—why, you yourself cannot escape old age in course of time. Hence it is prudent to have in view one room mainly designed for comfort of the aged and the sickly, which can be properly called a "hospital or a sick room," but at the time of building a new house in the expectation of health and happiness, the word may sound rather inauspicious, hence, to follow M. Coue and make it suggestive, let us call it a "Comfort Room." For being really comfortable it should satisfy the following requirements:

(1) It should preferably be on the ground floor to save the sick or the aged person the trouble of going up and down the stairs. If there be any lift for the purpose, then the first floor, which is healthier, is preferable; still there should be an easy staircase in addition, without any winding steps, for use in times of a possible break-down of the lift.

(2) A bath-room and a w. c., where there is a water-carriage system, or a commode arrangement where there is a conservancy system, should be quite close to it, preferably in an ante-room.

(3) The room should be so situated that it will be flooded by the morning sunshine, and will also get a free breeze by night. A south-east corner would be appropriate for this reason, with a verandah on the south.

(4) In the cottages for the middle classes, it should not be far removed from the kitchen, so that it would be possible for the ladies to attend or render prompt service especially to the aged who are usually not in need of constant attendance. Still, it is advisable to have another room, close to the comfort room which an attendant could occupy if and when necessary.

(5) There should be windows for ample light and a thorough ventilation, with blinds for obscuring light whenever necessary. Most sick persons find strong light unbearable.

(6) The room should be rather commodious; 15' \times 12' is a good size, but that depends upon the size of the cottage to be built. The floor should be of such material as will permit of easy washing and cleaning with a disinfectant.

(13) Guest-Room

A spare room even in a small cottage is welcome at all times. Not only ~~can~~ it accommodate ~~an~~ occasional guest, but it ~~can~~ be used for a number of other purposes as well. For instance, when there is no guest, it can be used as a library or a hobby-shop or for any other purpose which requires a quiet atmosphere conducive to concentration.

The ideal place for the guest-room, if the budget permits, is in a separate, detached guest-house, with a small verandah and a bath-room, or at least a toilet-room attached to it.

If this is not possible, a room inside the house itself should be allocated. The special requirements of this room, besides being well lighted and ventilated, are that it should be, as far as possible, independent of other rooms except the drawing-room (into which it may open), and the front verandah, and that it should have an independent access from it to the general bath-room and w. c. unless a special toilet-room is attached to the guest-room. Further, it should be sufficiently commodious to hold a bed, a writing-desk and a chair and davenport or at least a chesterfield chair.

(14) Nursery or Children's Room

A child is the most cherished member of the family—be it rich or poor. A home without children is no home at all, it is a dreary wilderness.

Nowhere is the right to enjoy perfect health to be more jealously guarded than in the nursery. The neglect of sanitation here saps the cheerfulness of childhood and ruins all the fair prospects of youth.

Children thrive best with free and frequent access to the outer air and light; so any arrangement that makes it difficult for children to get out into the open should be avoided.

By far the great majority of middle class families cannot afford to allocate a separate room for the nursery. However, some space for the child is very necessary, and, as far as possible, it should be under the eye of the mother working in the kitchen. In such small houses, therefore, a room or even a verandah adjoining the kitchen would be very suitable for this purpose. The floor of this room or verandah should extend so as to form an open terrace for use when the child requires a larger space. Those who are favoured by fortune to do so, should set apart the best room in the house for the exclusive use of the children. It should have a very efficient system of cross ventilation without causing a perceptible draught. The light should be sufficient, but not such as would cause a glare.

In order to be cheerful, the nursery should have a sunny aspect, with large, low windows and a cheerful outlook. The windows should project beyond the walls so as to form small balconies with hollow concrete boxes at the ends in which flowering shrubs could be grown. There should be a strong and safe railing round the balcony at least three feet high.

It is in the nature of active childhood to be noisy and often boisterous, which should not be checked. The door should be provided with double shutters, if necessary, so that their activities would not interfere with the comfort of other inmates.

It is a wrong notion that because a child is small, a small room should suffice for it. It is, in fact, just the opposite. The child is very active, it breathes much faster, it spends nearly twelve hours or even more out of twenty-four continuously in the bed-room, and as its tissues are continually undergoing growth and development, it requires a larger quantity of fresh air.

Sleep—"Nature's sweet restorer"—is very essential for the child and should be undisturbed even by day. For this purpose, the bed should be shielded both from light as well as from noise.

The chairs, tables and other furniture in the nursery should be of special design to suit the requirements of the young child; the tables should not be more than 2' high. The stooping habit and "short-sight" are contracted by the child for want of properly designed chairs and desks. Even if the child has to play, let it arrange the toys on the top of a low table and

play with them either standing on the floor or sitting in a low chair. Those who can afford a separate nursery room can certainly afford to provide the above amenities.

Coloured pictures protected by varnish against dirt and moisture should be hung on the walls just above the top of a dado 3 to 4 ft. above the floor so as to be within easy reach of the child. (By the way, children love bright colours.) The dado should be of a darkish colour—say dark grey, slate, or dark chocolate, so that children can draw figures with a chalk stick, as if on a blackboard, at their will. The surface of walls should be finished with light cream, primrose, yellow, or light blue.

Our first notions of home start from the nursery. With the above elements of comfort, children should be made to feel that food, rest, quiet and pleasant ease belong to this place, where nothing but ease and love would be expected from the ever-greeting mother. This kindly attention with orderly, clean and cheerful atmosphere, not only makes childhood happy but leads to strength, good nature, trust, courage, efficiency, character, and virtue.

(15) A Water Closet and Toilet Room

In cities and large towns, where underground drainage is constructed, the w. c.s can be flushed with water and as they remain free from noxious smells they could be built close to, or even inside, the house. Still, they should be separated from the adjoining rooms by means of a small lobby or at least a blind wall.

In country districts and small towns, there is usually ample space round buildings, and therefore either earth closets, or water closets, combined with septic tanks* are very suitable. The days of latrines on the basket system are now numbered, firstly, because the system has been found by experience not to work satisfactorily on sanitary principles, and secondly, because the sweeper class is being awakened rightly to a sense of self-respect and to their rights as human beings, and would give up the scavenging work in the not very distant future. Earth closets are very easy to maintain in a clean state, and yield a very valuable manure. Their only disadvantage is that they must be outside the house, though they may be quite close by.

Septic tanks can now be very cheaply and efficiently constructed. If the water-supply is sufficient, the closet can be built even inside the house, and if the supply is meagre, it is advisable to build it like an earth closet outside, though quite close by. The requirement of a septic tank is that there

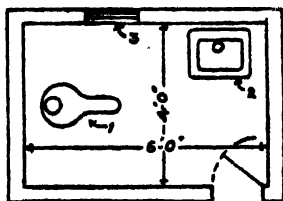
* The subject of disposal of domestic sewage in various ways has been treated in detail in the author's "Disposal of Domestic Sewage and Other Refuse."

must be an open space of at least $10' \text{ to } 15' \times 50'$ (depending upon the nature of the sub-soil) available near the house for a soak trench.

The minimum space required for a w. c. is $3' \times 4'$, and if a lavatory basin (either of pedestal or wall-bracket type) and a shaving mirror are to be provided in addition, the minimum size should be $4' \times 5'$. However, this makes the toilet room very cramped.

Figs. 24 and 25 show a small closet with all the necessary conveniences provided in a space of $6' \times 4'$ without a cramped effect.

Fig. 24.



1. W. C. seat.
2. Pedestal type Lavatory basin.
3. $2' \times 1'$ window at 5' above floor.
4. Shaving mirror.
5. Glass shelf.
6. Tumbler-holder.
7. Soap-box.
8. Tooth-brush holder.
9. Towel rack.

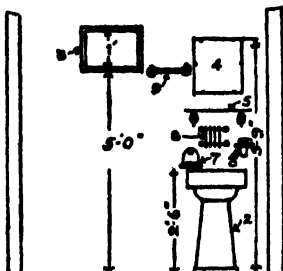


Fig. 25.

Strictest privacy is required in these rooms not only in respect of sight, but also of sound. The former can be achieved by so swinging the door-shutter (which should be single-leafed) that when open it should screen the seat. Sound insulation can be effected by constructing the partition walls of a hollow type.

The artificial lights provided inside the bath and toilet rooms should not be direct, but diffused by means of an opaque bulb or opaque glass cover.

(16) Garage

Man is conservative by nature. Just a few years ago in the days of the horse-drawn coach, in order to save the house from the smells and flies due to the dung in the stable, and the tramping noise of the horses, the stable was logically built away from the house in a corner in the back yard. Even

though the automobile replaced the old horse-drawn coach, we still build our garage in the same corner. But, as the motor-garage is free from the nuisance of flies and smells, and also from the noises of trampling, etc., we have now come to realise, though late, that if the garage is built to form a part of the house, not only would it not cause any nuisance, but on the contrary it would be a great convenience, because one need not, in that case, have to walk over in rain to reach the garage. Secondly, being quite close and handy, one can look to its and the car's upkeep much better, and thirdly, after a return from shopping, the mistress can bring in the purchases directly from the car into the kitchen. For the latter purpose, the modern trend is to build the garage near the kitchen and to provide a door from it opening into the kitchen or into the back verandah, if the automobile is owner-driven. A garage built inside the building is much cheaper than one outside because it saves one or two walls.

There is a possible argument against this practice, viz. that as the automobile contains inflammable petrol, there is the risk of the house catching fire. But, of late, buildings in concrete are mostly fire-proof, and if a few special precautions be taken such as providing cross ventilation and avoiding the use of a combustible material like wood in the construction of doors and windows of the garage, the fear can be minimised.

By building the garage as part of the house, so much space in the driveway is saved, which could be utilised in extending the garden or utility area.

In America, various devices are employed for automatically opening and closing the door of the garage from outside. One method is to focus a beam from the head-lights on an "electric eye" on the outside of the garage, which operates a lever to open the door. Another method is to transmit a code word by short waves from a radio installed in the car itself, which secures a response from a receiving set inside the garage and a switch is automatically operated. In the third method, the driver operates by hand while seated in the car itself a switch placed alongside the drive-way and the switch works the gear; and so on.

The modern trend of the automobile design is to increase the length of the wheel base, though the width of the car (or the length of the axle) has remained practically the same. The minimum inside dimensions of the modern garage, are therefore, $8' \times 18'$; $9'$ or $10' \times 20'$ would be ample to provide for future designs, if space is restricted.

Ordinarily, more than 7 ft. height of ceiling is not required for a garage. It would, therefore, be in the fitness of things if a loft of fire-proof material is constructed above this height in the garage for dead storage.

'Modern' Architecture

It is very difficult to define "Modern Architecture" because it claims no characteristics of its own beyond being simple and in harmony with modern ways of thinking and modern ideas of hygiene. Nevertheless, when we say "Modern Architecture," we do not merely mean the present-day architecture, but a certain definite style of architecture rationally related to the circumstances of modern life. Whatever the critic may say, nobody can gainsay that modern architecture is full of life and energy.

It was not more than fifty years ago that a group of continental architects such as Le Corbusier in France, Behren and Gropius in Germany, Oud and Dudock in Holland, McKintosh in Scotland, Frank Lloyd Wright in U.S.A., and others in other countries, almost simultaneously started a revolt against the meaningless ornamentation of the various traditional styles or orders of architecture, and initiated an altogether new style, almost revolutionary in character, against the 'debased' practice. This new movement got a stimulus in the post-war times. The drain of wealth during the Great War of 1914-18 caused such economic pressure that people were left with hardly the barest means of maintenance. All the new houses which came to be built after the close of the war were absolutely plain structures, providing just a shelter from the inclemency of the weather. People could not afford to spend on ornamentation. This acted as powerful incentive to these architects who, in spite of the gradual improvement in the economic conditions, continued a wide propaganda with great vigour, provoking thinking amongst people on a rational basis. The movement was dominated by the personality of the great artist and propagandist, Le Corbusier, whose revolutionary ideas, expounded with merciless logic in a series of articles and books, aroused the whole world to a revolt against the traditional architecture. Here is his extreme theory: that the so-called "architecture" does not exist, only "functions" exist. The "art of building" is a misnomer and should be replaced simply by "building"—that the architect, like the engineer, is concerned only with the organisation of functions without any regard as to whether the result would be beautiful or otherwise. That only a "well-being" exists in the sense of a building which functions with the minimum expense and maximum profit. That a good house is that which proves a good merchandise, and so on.

A large number of people all over the world were attracted by this theory in the beginning, but most of them soon found that it could not be applied consistently in practice. No architect of the first rank now practises

pure functionalism. One good thing, however, came out of this movement, viz., that it emancipated the architect from stylism.

As another cause of the rapid development of modern architecture may be mentioned the advent of novel materials and new inventions. Amongst them, Reinforced-concrete might rank first. This new, pliable material has immense possibilities which have not yet been fully explored. It is now possible to support large buildings on thin pillars a long way apart. *Chajjahs*, canopies or verandah roofs can now project a long way with a single support. *Jalis* or grilles of various ornamental designs, which were very costly, have become very simple and cheap, if made of concrete. A flat roof can be constructed of any span and over a room of any odd shape with R.C.C. which was impossible with a sloping roof. Leak-proof terraced roof, which is an outstanding feature* of concrete buildings, has now come within easy reach of the middle classes. Not only does it look more elegant, but it also provides double space—inside the house, as well as on the roof—either as a roof garden or as a place for sitting or sleeping in the open air for sixteen hours at least out of the twenty-four, which is a great blessing in a tropical country like India. The massive brick or stone walls can now be displaced by thin walls of R.C.C., thus making a saving in money and in valuable space.

Framed construction of modern buildings has also produced grid wall patterns, which are both æsthetic and prevent walls from being heated by the shades which they cast, if properly designed.

Coloured cement, which is a material of recent introduction, has been further helping in enhancing the beauty of modern buildings.

There is plywood and other similar thin boards, which enable us to cover large surface without extensive frame-work. They can be used for facings of walls also. There are several new materials such as chromium and stainless steel which successfully resist atmospheric influences. Then come the neon-lighting tubes and glass. The latter, the cleanest material, has come into universal use, not only for panes, large window-sheets, table-tops, etc., but also for furniture, walls and staircases. Then there are the plastics, in a very wide range of permanent, beautiful colours with glass finish, hard, light, elastic, proof against moisture, heat, electricity, acids, attacks of vermin, some of them more transparent than glass and unbreakable, which can be sawn, drilled, machined, moulded etc., available in the form of sheets, rods, rolls, pipes etc. Several other new materials can be quoted which have

* Though flat roof is generally identified with modern architecture, good modern buildings can be, and are actually built with sloping roofs. The latter gives a snug, cosy appearance, with picturesque casualness of pointed gables.

played an important part in altogether revolutionising the conventional architecture.

The *Esprit Moderne* essentially consists of functionalism and simplicity and devising new methods of construction to suit new materials. Functionalism is the quality in a building of being nothing but itself, i.e., maintaining or asserting its own individuality. A steamship, an aeroplane, or an automobile is beautiful not because of the elegance of its shape but because it is most adapted to its purpose. Similarly, a building must possess functional beauty. A school building, for instance, must look like a school and must provide all the conveniences of a school and, as such, must possess a style of architecture of its own, quite different from that of a hospital, of a residential building, of a hotel, of a railway station, or of a palace. This principle has a very wide application in modern architecture. The exterior of a building is logically determined by the plan, i.e., the interior arrangements which are considered first strictly in relation to their function or purpose. Every little thing, whether in the exterior or interior, must justify its existence of that particular place. Whatever materials are used, the construction is allowed a free and honest expression and no attempt is made to disguise it. No ornamental devices are allowed either in the interior or in the elevation, unless their existence is dictated by the necessity of its purpose in relation to structural elements. The architect has to make the most of proportion and mass and must bring out beauty by adopting simplicity of shape, balance, and grace of outline. He must make the whole building into a sort of pattern, and in this pattern no necessary things should come amiss, and no unnecessary things should find a place. For example, the tendency of the old fashioned architects was to conceal a chimney stack or a water tank by placing it in the midst of a turret; or conceal even the roof behind an ornamental parapet wall. The modern architect would show these boldly and make perhaps new, interesting, and real special features out of them in his pattern.

Traditional architecture concerned itself with two things: (1) adopting symmetrical fronts and (2) copying Nature. Both these do not appeal to the rationally minded modern architect. He laughs at the idea of providing a window or a staircase at great expense on the right-hand side, not because it would serve some useful purpose or is dictated by necessity, but only because there is a window or a staircase on the left-hand side with which it should balance in the front elevation. He views it from the points of economy and purpose, and as neither of these is served, he rules it out altogether. His argument is that copying Nature may be all right, but that it should not be done blindly. That even Nature is not blind but rational. It is true that

most animals present a symmetrical front. But there is some special object of Nature in doing so, viz., if one of the important organs gets out of order or falls into abeyance, there should be another to do the function. Again, if it is argued that symmetry is adopted to copy Nature, then why do so only partially, i.e., with respect to the front only? Nature is thorough, because if a median line is imagined in animals, the functions allotted to all the members on the right-hand side of the body are, in most cases, similar to those on the left-hand side also. Thus, not only two eyes, two ears, two hands and two feet are provided symmetrically, but also two lungs, two kidneys, etc. Again, if we are out for copying Nature, why restrict ourselves to the animal world only? The plant life tells quite a different tale. We find there that Nature is distinctly opposed to symmetry. The trees set forth branches at random; no two leaves or even petals of a flower are alike, in fact there is nothing stereotyped in Nature; on the contrary, she is fond of a rich variety, and the latter is the result of varying circumstances, different environments, through which Nature's product has passed. Why should we not, then, adapt our architecture to suit new ideas of design, new materials, and new methods of construction?

With the onward march of science, our very ideas of living and the entire outlook of life have changed. With greater facilities for travel and communications, we are determined to enjoy our lives and free ourselves from subordination to our surroundings and narrow limits of the old-type home. Woman is fast being emancipated from age-long drudgery resulting from haphazard planning. She no longer exists for the sole object of running a home. Servants have become a problem and we have to depend more upon ourselves. Thus, though we demand spaciousness, we also want freedom from encumbrances—from furniture and trappings that are difficult to clean. A compact home, amongst hygienic environments with a number of labour-saving devices, which would make it easy to maintain, is the cry of the day.

We have for generations been false to the fundamental principle of true and good architecture, viz., truth and fitness of purpose, until the advent of modern architecture. It is only when we enter the garage that we are in contact with reality for a short time. So many changes have taken place in our food, dress, habits and social customs, so many new discoveries and inventions have been made such as railways, telegraphs, telephones, television, gramophones, radios, electric appliances, aeroplanes, air-conditioning, etc., that our entire outlook of life is metamorphosed, and still, if one of our eighteenth century ancestors were to descend from heaven amidst us, he

would see the same architecture and the same methods of construction as he was practising!

To revert to the subject of new construction, piling bricks or stone on top of a foundation for walls is now relegated to the past. The modern architect supports his floors and roofs on thin pillars a long way apart, making the walls serve as panels or partitions with no structural function to perform. For insulating them against sound or heat, he devises means with new materials, and thus he is able to provide very large window surfaces in the panels for admitting light and ventilation which the old-time architect regarded as structurally impossible.

The modern house is judged by its utility and conveniences, by the comfort it provides and the success with which it meets our needs, and not by its superficial decoration. If designed on strict principles of modern architecture, it also fits into the surrounding landscape of which it becomes part and parcel.

It will be seen from the above discussion that the assertion sometimes made that modern architecture represents a complete divorce from traditions is altogether wrong. Rather, it is more in keeping with the fundamental principles of true architecture than the conventional architecture which we have long been accustomed to. It certainly does break with false conventions and debased practices.

Modern architecture seems to transcend not only the limitations of time and space, but even national traditions and bias. It is not the property or patent of any particular body or any one nation but a universal art offering boundless scope for development. Its influence extends to the furnishing and decoration also. Chairs, tables, beds, etc., of very plain, simple, unobtrusive design, but nevertheless cheaper, stronger, more comfortable, and more sanitary, because harbouring little or no dust on the plain, smooth surfaces, have come into common use. The furnishing is determined by common sense—which is the essence of good taste and by fitness of purpose—which is the basis of all sound design. The evolution of the modern kitchen in the Western countries, so as to be more efficient with less labour, is also the direct result of the move towards the new architecture.

Modern architecture is most suited to our country. In the first place, it is in keeping with our philosophical ideal, viz., "plain living and high thinking." Secondly, in a land of sunshine, with the contrasting effect of light and shadow, clear-cut features with smooth, sweeping curves present a more effective appearance. Thirdly, plain, smooth surface (whether in the exterior or interior of the house, on walls or furniture, which is one of the characteristics of modern architecture) allows much less chance for dust

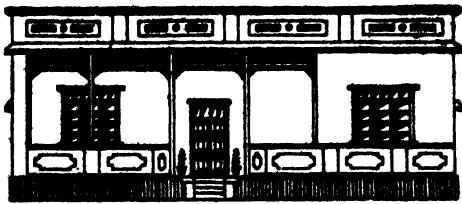
to deposit itself and is easy to clean in a tropical country like ours; and, lastly, it is the architecture of the masses, because with the growing development of the indigenous cement industry, cement promises to be even cheaper, and the other material, viz., the aggregate, especially sand and gravel required for concrete, can be had merely for the collecting in the countryside. Thus modern architecture caters equally for the needs of the rich as well as of the poor. It is up to the architects to rise to the occasion and make the most of the opportunities which are hidden in the womb of the immediate future.

In order to be able to approach the problem of exterior treatment with some degree of understanding, it is necessary to know some of the fundamental principles of architecture which will be discussed briefly here.

Truth and Honesty.— These come from (1) the use of sound materials of substantial size and good workmanship. No bending, shrinking, warping, cracking or leaking should be in evidence anywhere—not even in inconspicuous parts and (2) fearless and honest expression on the outside of what it is inside. No camouflage, no masquerading for what it is not, no

shams and pretensions like plaster imitations should be allowed on any account.

Proportion is one of the fundamental principles of architecture. There is definite relationship between the size and shape, or the length, breadth and height of a structure. It is very difficult to define that relationship. But the



FRONT ELEVATION

Fig. 26: Greater length than height.

eye and hand, accustomed by tradition and tuition and trained by practice, can easily determine the just and exact proportions, and the mathematician afterwards tries to reduce them to rules. For instance, a single-storeyed building with flat roof looks squatty, but can be improved in appearance by providing a tiled roof on it with good slopes. Another way of improving the proportion of low buildings is to construct a basement floor, and if that be not required or not feasible, even increasing the height of the plinth would considerably help in increasing the scale of height.

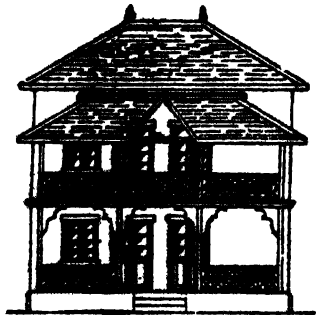


Fig. 27: Building too tall in proportion to its width, though symmetrical.

If, on the other hand, a building is too tall in proportion to its width, it should be so built that the broader side should face the street, and if this be not possible without sacrificing convenience, the effect of height can be considerably toned down by constructing an earth terrace in the front and on the sides of the building almost to the height of the plinth, and planting grass on it.



Fig. 28: A badly proportioned and unbalanced building creating the uncomfortable feeling that a high wind might blow it over.

Balance is a principle which expresses itself in a feeling of repose, as a result of stability and permanence. There are two kinds of balance—the structural balance is based on the principle that the stronger part should always bear the weaker. Structural balance manifests itself in the proper size and spacing of columns, height and size of chimney, etc.

Balance in mass has a relation between the “solid” surfaces presented by walls and roofs called the “mass” and the “hollows” provided by the door and window openings on the exterior facade. For a balanced effect, the mass must be arranged on both sides of an imaginary axis in such a manner as would produce an effect of equilibrium and consequent rest. Otherwise, like a pair of scales unequally loaded, it would create a feeling of unrest—of dissatisfaction in the mind of the onlooker. Attached garages, porches, bay-windows, etc., add masses which must be carefully thought out in relation to the elevation to bring about a balanced effect.



Fig. 29: A perfectly symmetrical and balanced house giving a soothing appearance.

Balance in mass may be either symmetrical or non-symmetrical. Symmetry, no doubt, gives a soothing effect, but, at the same time, it is attended with

a feeling of dullness and monotony, and tends to exercise a depressing effect. It does not appeal to the modern architect, particularly in respect of domestic buildings which demand certain freedom of expression—of informality. It is further antagonistic to the principle of truth. The author has in mind a

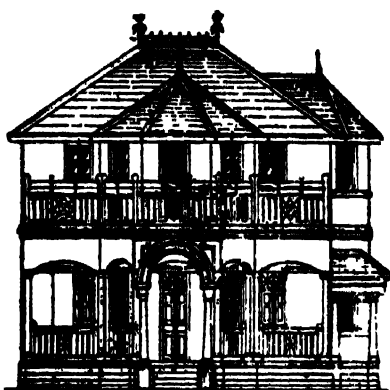
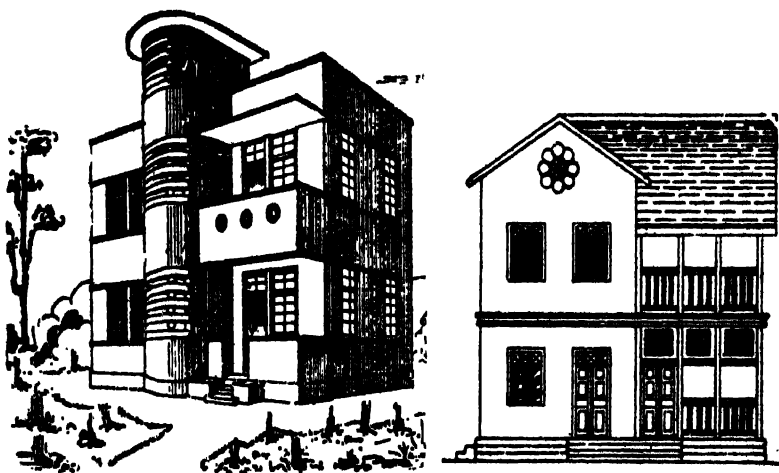


Fig. 30: A non-symmetrical, but perfectly balanced and proportioned building.

number of domestic buildings with facades built on strict principles of symmetry, both on the ground and first-floor, having all the windows of one size and design though the rooms behind them must be used for different purposes—some for sitting or sleeping and some for culinary or sanitary purposes.

Harmony is an effective blending of parts, often very diverse in themselves, into a rhythmic and consistent whole. It is analogous to the harmony of music. Harmony is destroyed by introducing details of

various unrelated styles of architecture into one dwelling or unsuitable ornamentation or discordant colours. The various forms, such as the square, triangle, circle, etc., have each their special fitness, but their improper combination produces a discord. Harmony in colour is discussed elsewhere in this volume.



Figs. 31 and 32: Two unsymmetrical, but perfectly balanced and proportioned houses.

Landscape Gardening

LANDSCAPE gardening is the art of planning the drives, walks, lawns, gardens, shrubs, flower-beds, etc., so as to form a beautiful setting for the building. This subject is of equally great importance as the architecture of the building itself. The plants and plantings are subject to frequent changes, but the garage and other buildings, and also the drives, walks, and shady trees will remain, in all probability, as they were first planned. Hence, landscape gardening demands careful thought at the hands of persons of good taste and training, and must be planned together with the building.

Landscape planning assumes a special importance in cities, because the plots are small and valuable and therefore every inch of the ground must be utilised to the best advantage.

The purpose of landscape planning is two-fold:

(1) To design such surroundings or settings as would accentuate the particular attractions of the house in the eyes of the passer-by, just in the same way as we provide a suitable background and a frame for a picture to set off its art.

(2) To create cheerful environments round the building so that they should react on the minds of the inmates and give them a pleasurable sensation at every glance.

Everything around us directly affects our senses. Even an infant feels delighted at the sight of a beautiful flower. When we hear a melodious note we involuntarily feel pleasure, if it be discordant we feel displeasure. We glance out of the window a hundred times a day. Should the scenery be beautiful, every glance will give pleasure which, when multiplied a hundred times, must prove an important factor in favourably moulding minds.

The modern trend in the civilized countries is to lay greater stress on utility consistent with beauty rather than on beauty alone. Thus it is customary to plan the front yard just to provide a sufficient foreground and to form a good setting for the building, and to plan the backyard more elaborately so that the family can derive pleasure amidst cheerful surroundings and full recreational enjoyment there, in the midst of the privacy afforded by it from the highway and the by-way.

The subject is so vast that it is not possible to do even partial justice to it here. Hence it is proposed to enunciate a few main principles only.

Before planning a garden study the peculiarities of the site which distinguish it from other sites. Perhaps it offers a ravine, outcrop of rock, unusual natural shrubbery, an odd hump at crest, or it may be dish-shaped or have a curved front or may be sloping. These are not undesirable features to be obliterated. But something unusual like these may suggest an inspiring theme. Preserve these eccentricities, and build them into the garden design.

Note the features outside the site, good distant views, ugly buildings etc. Remember also that the future of the surrounding land is not fixed.

The most difficult site is a level, rectangular or square plot, with uninteresting surroundings. The most effective way to break its monotony without chopping it into small sections, is to sink a portion 8" or 9" deep or heap earth to make a small ridge.

The first important step in home landscaping is to determine the structural design of the garden. It should be studied just as one would study a floor plan. Approach, entrance, driveways, out-door living space, recreation area, drying yard, experimental garden and nursery, kitchen garden, big trees, pool, fence, arbours and walks—all should be worked as carefully as the grouping of rooms. Decide what you must have, how much space is required for each, and make trial sketches until you succeed in obtaining the best solution.

THE FRONT YARD.—Cleanliness and a neat, tidy, and well-trimmed appearance of everything, particularly in the front yard, goes a long way in creating a soothing and restful impression at first sight.

While planning the landscape garden, cost of maintenance should not be lost sight of. The treatment, particularly of the front yard, should be simple and beautiful by the general artistic lay-out rather than by ornamentation difficult to maintain.

Though it is necessary to specify the minimum distance between the street edge and the building line, the exact minimum should not be adopted. A slight variation is desirable to break the monotony.

Any enclosed area appears larger than the same if open, because with definite boundaries all round it forms a unit whereas an open area forms a part of the larger space around it and, by comparison with it, looks smaller.

The horizontal angle of vision for objects at close quarters is about 45°, and so in order to command the full view of the width of a building, the minimum space in front must be at least equal to the width of the building.

The vertical angle of vision is less than the horizontal and, therefore, tall buildings need deeper front space than their height so as to enable the

passer-by to have a full view without lifting the eyes to see it as a single architectural unit.

There should be a shady tree or one or two shrubs round the front corners and not in the middle. In this position they provide a sort of a frame to the picture of the building, and soften the hard junction between the vertical lines of the walls and horizontal line of the ground.

It is a mistake to plan the home in the centre of the plot, especially if the latter be small, because by placing the building on one side of the axis the space left on the other side can be very usefully employed either for beauty or utility.

If the site is sloping, make two or more level plots by constructing low retaining walls between them, the slope then becomes a series of terraces.

The entire atmosphere around the domestic residence should be homely and informal, and, therefore, a strict observance of symmetry in the landscape design is not desirable, particularly on small plots where the effect of crowding of details due to symmetry would be more marked. However, there should be a sort of balancing effect brought out in the front. For example, if there be a thick hedge on the left-hand side of the plot, instead of leaving a blank on the right-hand side, it should be balanced by a shrub or an arbour.

The main entrance of the house, which is the centre of main interest in the picture of the building, should not be placed on one side, and if considerations of convenience require it in that position, then another feature such as a bay-window on or near the other end, or a group of windows in the remaining area, should be created to balance the facade and divide or distribute the attention on a larger area.

PLACEMENT OF THE GARAGE.— The garage, with its concomitant drive-ways, is an important factor in making or marring the landscape effect of a yard; so its position in the plot must be carefully considered.

If it be placed too far towards the rear there are three disadvantages:

- (1) Much space is wasted in the drive-way.
- (2) The distance for backing the car to reach the street and reverse the direction is too long on a small plot, which cannot afford to provide a "Y" turn near the garage.
- (3) It interferes with the privacy of the back yard, which is very essential to the family needs as an outdoor sitting place on a lawn or under a shady tree, by the movements in or out of the present day class of people as motor drivers, who should be kept at a distance.

If the garage is built on a side close to the building, it interferes with the light of the rooms opposite to it. Therefore, a position for it on one side

just behind, or a few feet overlapping the back end of the building is better.

A still better position is inside the building on a side, with a room or terrace on its top. This effects a saving in one or two walls and also of ground space as part of the walk can be joined to the drive. (See "Garage" under Grouping in Chapter VII.)

If the garage is built on one side of the plot, a minimum distance of fifteen feet has to be left between the building and the plot boundary—3 ft. for the hedge, one foot for a grass strip, 8 ft. for the drive-way and 3 ft. for shrubs in the front corner between the house and the drive-way.

DRYING YARD.—Every family normally requires a space to accommodate a minimum length of 50 ft. line of clothes for drying. The space behind the garage is very suitable for this as it is inconspicuous and compact—just 4 to 5 close rows of galvanised steel wire stretched in a space of 10' \times 5' are quite sufficient.

TERRACES.—A terrace of roughly-dressed stone slabs, laid in earth, with wide joints for grass to grow on, is suitable for more natural surroundings, e.g., near a pool of water or next to the lawn. If neatly-dressed paving slabs are laid in either cement or lime for the terrace, the latter proves very useful close to the house as an outdoor sitting place or play-ground for children. A terrace, after all, is a connecting link between the house and the out-door life in the garden. An open terrace close to the house should invariably be shaded by a tree or a row of trees, a pergola with vines trailed on it or an artificial gay awning cover. Such a room may prove to be an out-door living or dining room to be enjoyed for at least eight months of pleasant weather in most parts of this country. This should be close to the house and should form part of a verandah or living room opening outside.

LAWNS.—Lawns are not so successful in a tropical country like India as in the Western countries where they remain fresh and green all the year round. A well-trimmed and properly maintained lawn is an expensive luxury, but whenever one such is made and maintained, it is very pleasant and cheerful to look at; it proves an excellent broad space for out-door enjoyment, a play-ground for children, and the object of pride for the whole family. If its purpose be for the recreational enjoyment of the family, it should be constructed on the rear side with high boundary walls, hedge or latticed fence for seclusion and privacy from the neighbouring plots. It should be in one long stretch unbroken by any shrubs, walks or even flower-beds. If any details are desired, they should be arranged on the edges, but not in the middle. If a walk must be provided across the lawn, it should be made of roughly rectangular slabs laid in soil with wide joints so that the grass growing in the joints maintains the continuity of the lawn. For real

enjoyment the lawn should be as spacious as the plot of ground will permit. If a lawn is only intended for the sake of beauty, and not for an outdoor sitting place, it should be in the form of a sunken panel of grass.

WALKS.—There should not be too many paths and walks, which destroy unity. Flat stones laid apart, bricks, gravel spread between two rows of bricks on edge partly buried in earth are more attractive amongst sylvan surroundings, for paths than solid concrete or asphalt.

HEDGES.—Hedges of evergreen plants give an air of cheerfulness to the surroundings, and afford very good privacy, but the minimum thickness for the latter purpose is three feet. A long, unbroken stretch of hedge emphasises length and serves the purpose of an excellent background for the flower-beds. Hedges are the least expensive of all the plantings in a landscape garden. There are a number of evergreen shrubs suitable for Indian climates, which make an excellent shrubbery hedge, though some of them take considerable space even though the shrubs may be planted in two staggered lines. A single line of shrubs scarcely affords the necessary privacy. If economy is desired in the hedge space, latticed fences of steel wire, reed and similar material, or trellis-work of split bamboos, or teak wood with creepers of evergreen variety trained on them are recommended. They occupy less than six inches of space.

If a shrubbery is planted to form a hedge, the corner shrubs should be slightly larger and taller just to break the monotonous, wall-like effect in long stretches.

PLANTATION OF TREES AND SHRUBS.—The trees and shrubs for the plantation must be selected with due regard to their graceful form, ornamental foliage, and the correct height when fully grown.

Trees and ornamental foliage provide shade, serve as a frame to the picture with buildings as the central motif, screen objectionable views, and produce background and skyline effects. Hence, if the plot is narrow, those intended to frame the house should be planted almost on the boundary lines, and if wide, near the lines of projections of the side walls of the building. They should never be planted in front of the building unless the depth of the front yard exceeds forty feet.

Shrubs provide a three-fold purpose:

- (1) To make a pleasing connection between the sharp, vertical lines of the corners at front of the side walls and the flat, horizontal ground line.
- (2) To serve as a border and screen along the boundaries.
- (3) To give the plot the appearance of an independent unit, separated from the surrounding ones.

Reference to Location shown in Figs. 24, 25	Location in Plot	Purpose	Height when fully grown	Remarks
A-A	Sides of entrance	Accentuating and framing the entrance.	5 to 6 ft.	Fine-leaved bushy evergreen, graceful in form.
B-B	Front corners of steps.	To screen the bare stems of the shrubs at A-A and accentuate the entrance.	About half the height of the above.	Dwarf shrubs with thick foliage either planted in ground or in pots.
C-C	In front of windows.	To soften the view presented by the plinth masonry, if the latter be rough and unattractive.	To reach a few inches below window-sill.	
D-D	Corners of house.	Accentuating the sides and making a pleasing junction between the house and ground.	5 to 6 ft.	Clusters of two or three evergreen plants with large leaves and thick foliage.
E-E	In the front space between the entrance and corner.	For edging the planting.	1 to 1½ ft.	Dwarf shrubs or evergreen creepers.

The above table gives some details of the shrub plantation necessary in a landscape plan.

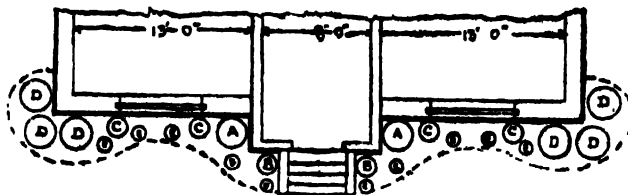
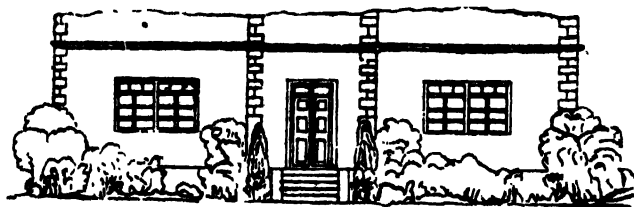
If the plinth masonry be of fine-dressed stones, the plants C-C should be in groups or clumps, at intervals, to expose the plinth masonry to view between the clumps. The width of plantation from the face of masonry to E-E, the edging plants, should be 3 ft.

The plantation of shrubs mentioned in the above table is shown in Figs. 33 and 34 in elevation and plan.

A large variety of plants is not in good taste, particularly in small yards. The entire composition should be dominated by two or three varieties only, not far different from each other in colour, which then serve as a simple but definite background, and then a number of other varieties

may be used in small amounts as a sprinkling to emphasise the general scheme.

FLOWER-BEDS.—The flower-beds should never be in narrow strips of 2 or 3 ft. as is usually done. A minimum width of 5 ft. should be adopted. The mass effect of flowers is very striking.



Figs. 33 and 34:

Showing plantation of shrubs in front of a building in elevation and plan.

Flowers look better from a distance, particularly when a suitable background of a hedge or a creeper is provided. Therefore, they should not, as a rule, be planted in small isolated plots at close quarters. Edging flower-beds by a controlled dwarf hedge of a colour to match, gives the garden a polished appearance.

An ideal place for flower-beds is on the side of the house in front of the living-rooms so that they present a cheerful appearance to the inmates peeping through the windows, and also to the passers-by looking from the street.

The walks between the flower-beds should have a minimum width of 4 ft.

The proper arrangement of the flowering plants with respect to their height, background, and colour so as to form a most pleasing design is the key to the success of a flower garden.

Every garden-lover wishes to possess plants that bloom all the year round. There are a number of such perennially blooming plants, but they do not satisfy all the requirements. Some of them are too tall to be used

except on boundaries; others have a rank spreading growth, and, therefore, are not suitable for flower-beds; still a few others have flowers which possess an unpleasant smell, and so on. But even these bloom more in one season than in another. It is, therefore, advisable to make a list of plants blooming in the three different seasons, viz., the monsoon, the winter, and the hot weather, and to plant them in inter-beds overlapping each other inside a large flower-bed in such a manner that when the bloom of the monsoon variety begins to ebb away, the winter flowers should begin to appear in the inter-beds either in the front or behind, a suitable colour combination having been previously thought out.

Beds of seasonal flowering plants of dwarf variety in concrete boxes overhanging from walls in front of windows, with their tops a few inches below the sill level, not only set off the beauty, but add to the charm, and liveliness of the home. As the plants are living and always remain fresh, they are superior to flower bouquets placed inside rooms in vases.

ACCESSORY DETAILS.—There are a number of accessory details which lend a charm to the landscape garden, such as fountains, statues, seats, pergolas, arbours, summer-houses, bird-rests, bird-baths, swimming pools, sundials, etc. Most of these, particularly fountains, statues, summer-houses, and pergolas are not suitable for small gardens. If they are to be used, they must be thoughtfully designed. More stress should be laid on simplicity and graceful form rather than on decoration. A massive but comfortable concrete seat is cheap and almost permanent. It should be screened by a tree against afternoon sun, and for preventing it from absorbing heat and radiating it after sunset. In respect of privacy, it should be secluded from the neighbouring plots by means of a high hedge or a brick or concrete wall and should be so placed as to command a view of the best part of the garden. In short, it should be inviting. Paved terraces, crazy paving, lily pond, sunk garden, etc. can all come within the reach of a man of moderate means.

A pool serves several purposes. If elegantly shaped in design and properly framed by means of flower-pots, etc., it is a centre of attraction. It affords also a storage of water for plants. It may also be used for growing water-lilies. Thus it proves a great asset to a landscape garden even in a small plot. Care must, however, be taken to see that the water is frequently renewed and that no mosquitoes are allowed to breed.

An arbour in an informal style, or a small well in a cottage-type garden serve as focal points.

VEGETABLE GARDEN.—Scarcely a house-owner may be found who does not want a vegetable garden, even though a small one, on his plot. But he

need not be disappointed. By good planning, it is possible to reserve a small space for it even on a small building plot. It should be remembered that for the normal needs of an ordinary family even a few square feet of space, with vegetables growing therein all the year round, is sufficient if well manured and cared for. It is a fact beyond doubt that our food—whatever be the province—is deficient in green leafy vegetables which are very necessary for the proper building up of the body. We could at least grow this stuff for our needs even on the smallest plot.

Fresh vegetables which are full of vitamins, are very wholesome and appetising. Moreover, vegetables grown in one's garden, particularly with the whole family's labour, including young children, carry a special relish about them, and, therefore, it is worth while trying them on the part of every property owner.

If a building plot is long and narrow, a portion on the extreme rear of its full width could be very easily utilised for this purpose. If it be short and wide, a long but narrow strip on one side behind the drying yard may be set aside for that purpose. The vegetable garden may be profitably surrounded by a hedge with creepers which yield pods or fruit, such as beans, pumpkins, snake-gourd, etc. Some of these creepers yield fruit perennially for the kitchen.

BOUNDARY WALL OR HEDGE.—It is a common practice in this country to build a solid, high, masonry wall along the boundary. But it conceals your garden with its numerous features and is not in harmony with them. Instead it is advisable to put a low ($1\frac{1}{2}'$ to $2'$ high) wall and erect on its top either R. C. C. ornamental *jali* or w. i. grille. Better still an evergreen hedge planted in a double row and kept neat and trim by pruning matches better with the garden setting. *Inga dulcis*, or *Dodonea viscosa* grow luxuriantly from South to North in this country. The former is rather rough and hard to pruning, but effectively keeps animals out. The latter is ornamental with small, beautiful, shining leaves.

If you are not a garden enthusiast a still greater care is required in designing. For, a garden originally designed at great thought to details and subsequently neglected gives a bad effect to the whole surrounding. In such a case provide large areas of brick paving with a minimum of slow-growing shrubs, of a variety which are not eaten by goats, a pair of small trees, and perhaps a trim vine growing on a high brick wall. These will require little care and yet suggest a garden.

Interior Decoration and Colour Schemes

CLOURS exercise a powerful influence on the human mind. Physiologically, they act upon the optic nerves through the media of our senses. People in robust health may not feel their effects immediately, but the weak, the invalid, and the sensitive are very susceptible to their influence. If they are in harmony, a sensation of cheerfulness and pleasure is produced. If, on the other hand, they are discordant or harsh, irritation of nerves, even amounting to headache, is the result.

The psychological effect of colour on the human mind is perhaps more important than the physiological reaction. It is well known that certain forms of insanity can be cured by the action of coloured lights. The psychological effect owes its origin to certain ideas or sentiments associated with certain objects having particular colours. For instance, in England, the sunshine even by mid-day is never so bright as even that for a couple of hours in the early morning on a winter day in our country, and, therefore, is very cheerful and enjoyable. The yellow colour suggests to them the mild sunshine in their country and, therefore, all the ideas such as those of cheerfulness and happiness are attributed to it. The dress worn on funeral occasions amongst Christians and some other communities is black, and thus "black" is regarded as mournful. Amongst us Indians, ideas of darkness, ignorance, sin, etc., are associated with it, and that is why it is detested; it does not convey any sentiment suggestive of or associated with mourning. Red is indicative of blood; hence, in Western countries ideas of cruelty, violence, murder, etc., are associated with it. But when toned down it expresses warmth, physical strength, vigour and life. Amongst us, particularly amongst the Hindus, red suggests both cruelty as well as auspiciousness, since it is the colour of both blood as well as *Kumkum*. Physiologically, too, red, especially when strong, strains the eye and, as it does not reflect light freely, darkens rooms. Green is abundant in nature, and we are very familiar with it; besides, it is a soothing and restful colour and, therefore, it appeals to most of us. It expresses freshness and coolness.

Thus it is these sentiments, attached to the colours by association with objects, which, in fact, make us feel happy or depressed. In spite of this powerful influence colour exercises on our minds, the majority of people are ignorant of the theory and effect of colours. The real artistic taste is found to be developed only in a few people. What commonly passes for artistic

taste is, in the majority of cases, an imitation of what "persons of taste" have done.

This is particularly so in our country. Our senses of touch, smell, taste, and even that of sound are all live and sensitive. If we happen to touch something dirty, disagreeable, or impure (even from a religious point of view), our sentiments revolt; if there is something giving out a bad odour even far away, our acute sense of smell is awakened, and we hold a handkerchief to our nose; the sense of taste is developed perhaps even more. Few people would lightly value the preparations of a good chef or put off well-dressed dishes till Sunday. The sense of sound, too, or what is called an ear for music, seems to have developed in the majority of people, so far at least as to enable them to appreciate a harmonious melody. But the equally or perhaps more important sense of sight is surprisingly neglected. The beauty of form may appeal to most, but, by constant association with things that are crude and vulgar in colour from our very childhood, healthy development of this important sense has been totally neglected. It is, therefore, proposed to discuss here the elementary principles underlying colour.

Before doing so, it would be well to define a few technical terms so as to avoid possible confusion.

The Distinction Between Tint, Hue and Shade.— By mixing white with any colour, a *tint* of the same colour is produced. *Tone* means the same thing. As more and more white is mixed, the value of colour progressively increases.

By mixing a colour with another colour, a compound colour or *hue* is obtained.

By mixing tints of colours with black, *shades** are produced.

A colour is *broken* or *greyed* by mixing it with other colours either harmonious, or contrasting, or both, to make it lose some of its original character; i.e., it is subdued or made milder; a broken or greyed colour is still recognisable.

Harmony is that combination of colours in which each colour matches with the next adjoining it, and the combined effect of them is to present a neutralised bloom causing a soothing and pleasant reaction on the eye. In a harmonious combination, no single colour attracts the eye, but every colour merges its individuality to produce a common pleasing effect.

Discord is the opposite of harmony, in which each colour, instead of making a pleasing combination with the one adjoining it, produces a jarring

* Though the scientific meaning of *shades* is as above, it is frequently loosely used to mean a tint or a tone as in the expression, "Panels of walls should be in the same as, but of a slightly lighter shade than, that of borders."

effect with it. The result is to strain and fatigue the eye, and, if the discord is very sharp, even to cause a shock to the sense of sight by the violence of the discording colours.

Contrasting colours are those which, when placed side by side, make each of them look more effective. Contrast is not the opposite of harmony; contrasting colours when in juxtaposition produce a pleasing effect, but unlike in harmony, each asserts its individuality and provides a good setting for the other close to it. Contrasting colours are complementary to each other, and do not change when placed together. But when they are mixed together, they neutralise each other, and neither of them is recognisable. Black and white, red and green, blue and yellow, i.e., colours opposite to each other on the colour wheel (vide Fig. 35 facing page 86) are contrasting colours.

In order to explain the mutual relation between harmonious, contrasting, and discording colours, a simile from practical life will serve better.

Harmonious colours are like sincere friends and co-operators, one forgets himself to help the other and the result of their combined goodness is to bring about peace, harmony, and prosperity to the community which they may be serving.

Discording colours are like sworn enemies who, if brought together, look angrily at each other and create an atmosphere of discord and violence about them.

Contrasting colours are like ideal pair of a *Guru* and his devoted disciple, both persons of great distinction, each is complementary to the other and enhances the importance of the other.

What are called *primary* colours are only three, viz., *yellow*, *red* and *blue*. All other colours—even those in the spectrum of the sun's rays—are produced by compounding these in different proportions; but these three colours are not themselves capable of being produced by composition of other colours, and that is why they are called *primary*.

Fig. 35 shows a colour wheel, which would serve as a key to the understanding of the relation between various colours in respect of their harmony, discord, and contrast. Only a few prominent colours have been included in the chart to simplify matters. Once initiated, the reader who is interested in studying complex problems can prepare an extended chart for himself.

The chart is based on the table prepared by Rood after a very large number of experiments and investigations. It was Rood who first discovered that there subsists amongst colours a natural order which, if followed, produces harmony, and if reversed, creates discord.

A close observation of the chart will reveal that there is yellow at the

top, which is the lightest colour and, therefore, nearest to white, and that at the bottom is violet, which is the darkest, and, therefore, nearest to black. It will be noticed that if you go from yellow to violet, either in a clockwise direction through orange and red, or in an anti-clockwise direction through green and blue, each succeeding colour is darker than the preceding one between the two extremities, viz., lightest yellow and darkest violet. White and black do not find a place in the chart as they can be produced by mixing other colours. The white light of the sun splits into seven colours of the spectrum.

It is worth noting that the order of the colours in the sun's spectrum viz., VIBGYOR does not differ from that of the colour chart given on the next page. Only start from V(violet), go in a clockwise direction, and stop at R (red).

HARMONY

Rood showed that if the natural order of the colours and their relative depth or darkness be maintained in any colour scheme, harmony is created. Thus, if we take two colours, say orange and red first, and colour a surface with a certain tint of orange, the red colour coming close to it must be of a deeper shade than that of the orange for a harmonious effect. If a third colour, say purple, is introduced, it must be of a still deeper tint than that of the red, and so on. The same thing holds good of the left-hand series also.

It does not matter if one or more intermediate colours in the series be altogether missing in a colour scheme; so long as the natural order is maintained, harmony is bound to prevail. For instance, if yellow and purple are used, the purple must be of a deeper tint than the yellow.

To make it easier for understanding, two tables are given below showing how harmony would be effected. These should be read while making a reference to the colour chart.

SERIES NO. 1

<i>Colour</i>	<i>Harmonises with a deeper tint of</i>	<i>Harmonises with a lighter tint of</i>
Yellow	Orange-yellow	
Orange-yellow	Orange	Yellow
Orange	Poppy red	Orange-yellow
Poppy red	Crimson	Orange
Crimson red	Purple	Poppy red
Purple	Violet	Crimson red
Violet		Purple

SERIES NO. 2

<i>Colour</i>	<i>Harmonises with a deeper tint of</i>	<i>Harmonises with a lighter tint of</i>
Yellow	Yellow-green	
Yellow-green	Green	Yellow
Green	Blue-green	Yellow-green
Blue-green	Green-blue	Green
Green-blue	Prussian blue	Blue-green
Prussian blue	Cobalt blue	Green-blue
Cobalt blue	Ultra-marine	Prussian blue
Ultra-marine	Violet	Cobalt blue
Violet		Ultra-marine

The harmony described above is of a simple type. Such simple types abound very much in Nature, a few of which are quoted below:

Fresh sprouts have light yellow-green leaves, which gradually change into green and ultimately into deep green or bluish green. Observe the brilliant and fresh colours on the leaves of *Coleus*, particularly of plants kept under a thick shade. Two or three simple harmonies of colours in both the series will be found on the leaves—a very striking example of harmony in colours on leaves. The leaves of *Caladium* show a similar harmony. If a mass effect is desired, look during spring-time from a distance at a row of trees lining the street; all the series from light yellow-green to green blue in large masses of foliage will be noticed.

Again, in most flowers, when the colours red and yellow come together the tint of the red will invariably be darker than that of the yellow. Almost all coloured flowers exhibit a partiality for harmony. Take the *Canna* for instance; it is a perennially blooming plant with a number of varieties; the flowers are all of different colours from white or cream to brilliant red, some have spots of bright red on deep yellow petals; however, all the varieties exhibit harmony to a wonderful degree, the colours of their flowers contrasting with green or blue-green leaves.

Most of the fruits obey the same law of harmony in colour. Take the orange for instance. When it is quite unripe it is green, as it grows to maturity the colour changes to lighter green, then to yellow-green, then to yellow, to orange, and finally, to orange-red in the ripe fruit. Apples do this in a still more striking manner. Lemons, cucumbers, pumpkins, chillies, brinjals, berries, all obey the law of harmony. The half-ripened tomato shows

two harmonies, one in each series, viz., (1) green, yellow-green, and yellow, and (2)-yellow, orange-red, and red.

The brilliantly coloured birds, such as the parrot, peacock, and others also show obedience to the laws of harmony, though there is oftentimes a harmonious contrast.

Colour schemes for interior decoration based on harmony are the easiest and safest of all, though at the same time they are less interesting and lack thrill. The simplest scheme based on harmony is with spots, flowers or figures, forming a pattern in a colour of original or of less strength on a surface coloured in a paler tone of the same colour. A further advance is to mix two or three different harmonious schemes together on a background of the lightest colour of them. In more complex harmonious schemes, broken colours in different shades are used to harmonise with each other. The modern trend, however, is to disfavour a harmonious scheme even of a complex nature, as it lacks the element of adventure and surprise. A harmonious scheme, howsoever cleverly it may have been designed and worked, is dubbed as lifeless.

DISCORD

When the natural order of colours shown in the colour wheel is reversed, discord is created. This is possible in two ways, viz.,

(1) By using a lighter colour shade than the preceding, in the colour chart or,

(2) By using a deeper one than that of the succeeding colour in the chart.

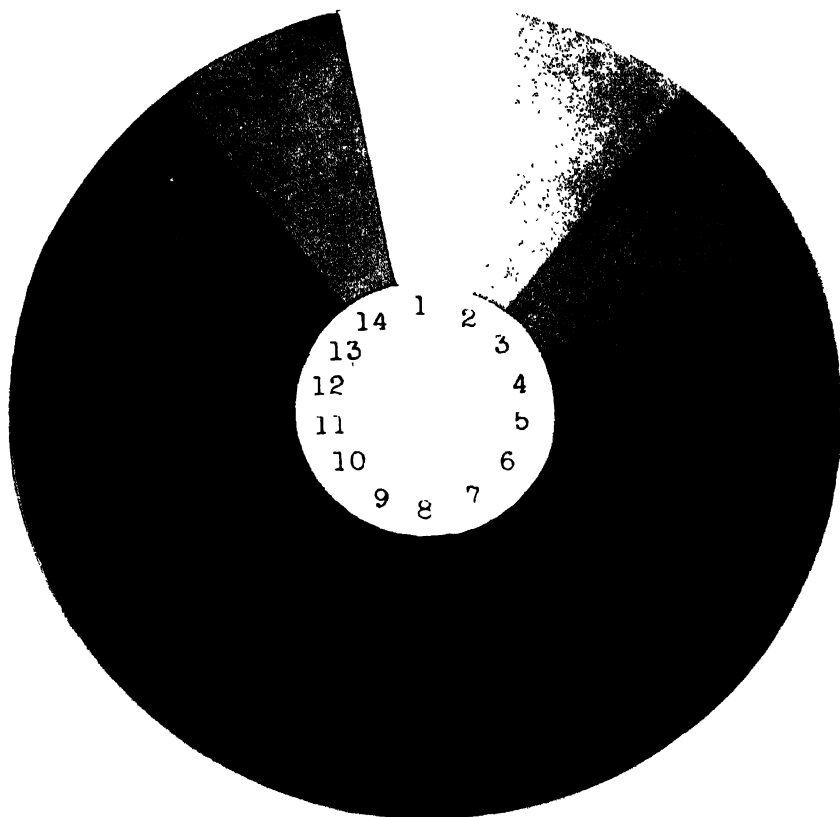
Thus if a reference is made to the colour wheel facing page 86 we get the following table:

SERIES NO. 1

<i>Original colour</i>	<i>Discord with lighter tint of</i>	<i>Discord with deeper tint of</i>
Yellow	Orange-yellow	Yellow
Orange-yellow	Orange	Orange-yellow
Orange	Poppy red	Orange
Poppy red	Crimson red	Poppy red
Crimson red	Purple	Crimson red
Purple	Violet	Purple
Violet		

COLOUR CHART

EXPLAINING THE PRINCIPLES UNDERLYING HARMONY,
CONTRAST & DISCORD OF COLOURS.



- | | |
|--|---|
| 1. Yellow (<i>Lemon</i>) | 2. Orange— Yellow (<i>Light Chrome</i>) |
| 3. Orange (<i>Mikado</i>) | 4. Poppy Red (<i>Scarlet</i>) |
| 5. Crimson Red (<i>Spectrum Red</i>) | 6. Purple (<i>Violet-purple</i>) |
| 7. Violet (<i>Fluorite</i>) | 8. Ultra-marine (<i>Cyanine Blue</i>) |
| 9. Prussian Blue (<i>Olympic Blue</i>) | 10. Cobalt Blue |
| 11. Green Blue | 12. Blue Green |
| 13. Green (<i>Peacock Green</i>) | 14. Yellow Green |

Please refer to the note on the reverse side.

There are two series; both start from the yellow, which is the nearest to white, and end in violet, which is the nearest to black. The first goes in a clockwise direction through orange, red, etc., while the other goes in anti-clockwise direction through green, blue, etc. The colours as they stand in the chart are in harmony. If the order is reversed, discord results. The colours opposite to each other are contrasting colours. The yellow and ultra-marine, orange and blue, purple and green, red and blue-green or green-blue, etc., are contrasting colours. The chart can be extended and any colour can be given its proper place in it.

Note:-- The nomenclature of the tints and hues in the chart shown in brackets, is according to Ridgway's standard.

CAUTION--DO NOT EXPOSE THE CHART TO STRONG LIGHT FOR LONGER THAN NECESSARY.

SERIES NO. 2

<i>Original colour</i>	<i>Discord with lighter tint of</i>	<i>Discord with deeper tint of</i>
Yellow	Yellow-green	
Yellow-green	Green	Yellow
Green	Blue-green	Yellow-green
Blue-green	Green-blue	Green
Green-blue	Prussian blue	Blue-green
Prussian blue	Cobalt blue	Green-blue
Cobalt blue	Ultra-marine	Prussian blue
Ultra-marine	Violet	Cobalt blue
Violet		Ultra-marine

Though discord is jarring, and it strains the eye and gives a violent shock to the sense of sight, it is often necessary. Otherwise, prolonged consistent harmony would be tiresome. If life were only a bed of roses, nobody would appreciate the value of happiness. A pinch of salt or of hot spices is necessary when the palate is tired of sweet dishes, nay, there is a craving for it. Too smooth, too easy a life becomes dull and boring. There must be something of a thrill, some romance or surprise. But the latter should be just enough to recall the full value of the smooth, harmonious life. In a similar manner, a little discord, if judiciously administered, adds zest and stimulates the entire atmosphere of a room.

Too much discord is, at the same time, a dangerous thing to use. If it be even a little more than just necessary, it mars the whole effect. It should never be given a prominence such as on a wall surface or a screen, which must always serve as a background; it should be allowed in accessories, such as a vase, glazed pottery, cushion covers, flowers, bouquets, etc.

It is sometimes very difficult to avoid a discord. For instance, in a colour scheme with a violet or purple background, which are the last colours in the colour wheel in both the series, even though their tone be very pale, they would require even paler green or yellow for the sake of avoiding a discord. But if very pale colours are used, they would look quite flat and would have no "body" at all. Under such circumstances, just a line border of a little deeper tint of violet or purple, as the case may be, or an outline of white round the figures of yellow or yellow-green in the pattern would considerably save the situation.

CONTRAST

In the colour wheel, any colour in one series is complementary to the colour exactly opposite to it in the other series. The complementary colours are called contrasting colours. Thus purple and green, yellow and ultra-marine, etc. are contrasting colours. It is often loosely said that red and green, or blue and yellow are contrasting colours, but it is not strictly true. This can be verified very easily. Look steadily for a minute at a strong red colour and then turn your eye to a fresh green surface, you will invariably see a blue patch before your eyes. Instead of looking at green, if you had looked at blue, a green patch would have appeared, indicating that the complementary colour of red is a combination of green and blue, and neither of them singly. The reason why the green or blue patch appears before the eye is that after looking steadily at a strong colour the eye gets tired and tends to see the opposite of that colour.

Contrasting colours when placed side by side, not only do not change or re-act upon each other, but each heightens the effect of the other. Thus, when black and white come together, the black causes the white to look whiter by contrast and *vice versa*. That is why contrasting colours are said to be complementary to each other. Here is a list of a few important contrasting colours, which can easily be verified with the help of the colour wheel.

<i>Colour</i>	<i>Contrasting Colour</i>
Yellow	Ultra-marine
Orange-yellow	Cobalt blue
Orange	Prussian blue
Poppy red	Green-blue
Crimson red	Blue-green
Purple	Fresh-Green
Violet	Yellow-green
Black	White

Contrasting colours look most beautiful when they are of equal strength and when one of them is in small areas and the other in a large surface surrounding the small areas.

Contrast in colours abounds in Nature, but not in very large surfaces. Red flowers amidst green foliage is a very favourite contrasting scheme with Nature. The brilliantly coloured birds have contrasting strong colours on their wings. As contrasting colours attract the attention, they have been advantageously used on most of the national flags, and also on starboards of ships and railway and road signals. The sky is full of contrasting colours at sunset.

In decorative schemes, contrasts are not so dangerous for use as discords, because they are not jarring. What they do at the most is to attract the interest of the looker-on toward themselves and thus throw the entire colour scheme, even though rich and elaborate, into insignificance. Therefore, contrast must be used just like discords in small quantities and in unobtrusive positions just to serve as an emphasis or as an accentuating note. The piping of the edge of a cushion, edges of a lamp-shade, a chair-cover, door or cupboard handles of bakelite, etc. in strong contrasting colours, are some of the suggestions.

COLOUR SCHEMES

With the foregoing discussion of the theory and principles underlying colour schemes, the reader will, it is hoped, be in a position to understand at least what would cause harmony and what would bring about discord. It is not possible to lay down definite hard and fast rules as to what colour and its combinations would look best, because it is wholly a matter of individual taste. One person may be fond of a particular colour which another person might abhor. All colours are beautiful; there is not a single one, the colour scheme built on which cannot be pleasing.

Equipped with the knowledge already acquired with the help of the colour circle, the reader should no longer accept a scheme thrust upon him by his contractors, or copy what his friend has adopted for his own house, even though the latter be a person of artistic taste. To help him a little further, a few facts universally accepted are given below.

It must never be kept out of sight that light is the basis of every colour scheme. Without light, colour has no existence. Therefore, the colour scheme of a room primarily depends upon the manner in which it receives light. This assumes a special importance in a tropical country like India. In England and many other Western countries, the sky is always full of clouds, often for twenty-four hours, and there is very little sunshine, if any at all. Therefore, in spite of the provision of large windows in every exposed wall, the light inside the house is grey and never white, and, therefore, colours of only less than half their original brilliance look at their best. This is a warning against copying even those colour schemes which have been announced to be the best in those countries. Here, in our own country, even the strongest colour is neutralised and considerably toned down in the dazzling light. Moreover, the direct sunlight adds a tint of yellow or white to all the colours and, therefore, makes them look paler. Even the black colour loses much of its sombreness and depressing effect in the bright sunlight. We are often classed by the Westerners in the same category as the African negroes and shown up as

being fond of garish, brilliant colours, so much so that the expressions "Orient blue," "Indian red" are applied to blues and reds of original strength. Similarly, the term "riot of Oriental colour" is often applied to a scheme in their country in which strong contrasting colours are used. But there is nothing wrong or unnatural in it. Even Nature has adopted it. Not only coloured birds like the parrot and the peacock in the Orient have brighter colours, but even the flowers in the tropics show a partiality for more brilliant colours than those in the cold countries. If we were to use the colour strengths which are used in the Western countries, whether in textiles or interior decoration, they would all be neutralised by the dazzling sunlight. Besides, strong sunlight has a tendency to fade or bleach colours.

The light coming through windows in the eastern side of the house is bright and very cheerful as the morning sun is very pleasant. Further, as the sun rises, the morning light gets warmer and brighter. Whereas the light through the windows in the western walls is hot, causes restlessness, and gets fainter and fainter as the sun sinks down below the horizon. It is, therefore, necessary to treat the two rooms, in respect of colour, in two different ways.

In a similar manner the north light is always cold,* but uniform in strength, while the south light is moderately warm and varying in brightness according to the season. It is, therefore, necessary to avoid very cold colours such as blue, grey-blue, green-blue, etc., in the rooms facing the north and adopt such colours as yellow-green, light rose, cream, buff, etc., instead. The colours in a hot room should be cold and soothing, and those in a warm room moderately so, though this further depends upon the purpose for which the room is used.

After this, the proportion of the window space to the room size (both floor area and height of walls) must be considered. Suppose the window is very large in proportion to the size of the room. The result would be that the glare of the dazzling light would soften the colours and make them look flat, if they be light, both by the direct action of the dazzling light and also by the reflection of light from one wall to the other. Therefore, a colour comparatively bright but restful and dull in reaction would be appropriate in large forms or designs. Thin lines or small forms in delicate colour would not be seen at all.

In dark situations, on the other hand, for instance, in a large room with small windows situated far apart, the colour to be used must be such as

*Here again, the circular colour chart facing page 86 is helpful. As a general rule the yellow-green-blue series of colours on the chart and the combinations of other colours with the light colours in that series, such as lime green, blue grey, French grey, etc., are cold colours, while the colours in the red-purple series and their com-

would be reflected from the lighted portion of the surface to the dark spaces and corners, and remove the gloom therefrom. In such rooms, the treatment also of the ceiling should be of colours which reflect light so that the capacity of lighting on the part of the windows would be increased.

This is exactly what is done very effectively in the Mughal palaces at Delhi, Agra and Bijapur. To avoid the strong glare which tires the eye, they constructed inner apartments with thick walls for coolness, and provided them with small windows. This had, naturally, a tendency to make the apartments look gloomy and dull, which they successfully remedied by using very bright colours on the walls and even brighter colours and gilding on the ceiling, which reflected their colours into the dark corners and imparted an air of cheerfulness to the entire apartment.

If the walls are disproportionately too high, they can be made to look low by providing a dado at the bottom and a frieze at the top. The dado is usually from one foot to three feet in height, and should never be higher than the height of the back of the chairs. Its colour should match that of the doors and woodwork. The frieze should be of the same colour as either the wall or the ceiling, but of a lighter tone, and should harmonise with the adjoining colour. Another way to reduce the apparent height of the walls is to darken the ceiling and give it a coat of copal varnish so as to make the surface glossy. The partial reflection of the floor into the ceiling gives an effect of its having come down.

For increasing the apparent height of the ceiling, on the other hand, one way is to paint the ceiling lighter than the walls. Like the sky outdoors, a light coloured ceiling leads the eyes upward, and gives a feeling of height and freedom. Another way is to give a perpendicular effect by drawing vertical stripes on the wall so as to divide it into tall and narrow panels. The stripes may be of the same colour as the panels, but of a little deeper shade. They might offer an opportunity for showing an effect of contrast in a stimulating colour in the form of thin edging lines on the borders of the stripes.

An effect of increase in the length and breadth of a room can be obtained by painting or distempering the walls and the ceiling in the same colour tone. The same effect can be further increased if the colour of the floor, or at least that of the carpet, matches closely that of the walls. The continuity between the walls and the ceiling, or the walls and the floor, conceals their extremities and gives an effect of something like endlessness.

The foregoing discussion explains the theory underlying colour schemes in interior decoration. But when an amateur has to face a practical problem, he is sure to be confused as to how and where to start. The advice is that if

he is writing on a clean slate, i.e., if his house is newly built and is to be newly coloured and decorated, if also all the furniture, curtains, carpets and other accessories are to be newly purchased, then it is a comparatively easy task. He will, in all probability, have a fancy for some particular colour, no matter even if it be red. Let him build his colour scheme on the basis of that colour. He will first think of the windows, and the light coming through them. (This is very important because the windows are once for all fixed into walls and, therefore, though the light can be lessened, it can never be increased.) Then he will think of the curtains which will match his favourite colour. It is better because it is easier to buy the curtains first and then to colour the walls to match the curtains, rather than to colour the walls first with a certain colour, and then to hunt for curtains of a pattern and colour to match. As a matter of fact, such curtains may not be available at all in the market. When the curtains are purchased, they should be temporarily hung in the windows and the light reflected by them onto the walls watched. A patch of the desired colour may be applied on the wall or a paper coloured with the tint held against the wall where the light from the curtains is reflected, to watch the effect. In this way, the shade which gives the best effect may be determined by trial. After this, the colour of the dado, ceiling, and carpets should be decided upon. The dado should always be slightly darker and the carpet still a shade darker as they are more liable to be soiled and then look dirty if coloured in very light shades. The ceiling should be of a lighter shade, especially if the room is not adequately lighted, so that it would reflect light. When this is done, the colour and shade of the upholstery, chair-covers, cushion-covers, lamp-shades, rugs, ash-trays, book-cases, etc., are to be determined. Upholstery and chairs are not of great importance, because, if they are not of the desired colour and shade, the defect can be remedied by providing covers of the required colour and shade. In this way, the entire scheme should be completed.

If, however, a colour scheme is to be prepared to suit a house, which is already in existence, or to which some additions, alterations, or in which renovations are to be made, it is rather a difficult job. In this case, some nucleus may be chosen round which a scheme may be built. For instance, there may be some valuable woollen rugs, or some costly piece of furniture already in possession which cannot be disposed of. These or similar articles might provide a basis for suggesting a suitable colour scheme. Unless a room is detached from the main house, or forms an altogether separate unit isolated from the other rooms by something like a staircase, or a lobby, the scheme for the entire house should form one unit, individual rooms—one opening into the other—forming parts of that unit. Of course slight modifications will be

required to suit the aspect of each room, and are essential from the point of view of avoiding a monotonous effect.

The science of interior decoration is very interesting and provides full scope for any amount of thrill and excitement for one who wants it. As the modern interior architecture has dispensed with all mouldings and ornamental tion, the importance of decoration by colours has increased several times. The amateur, however, is advised not to dabble in contrasting schemes until he has tried several schemes based on harmony, and acquired sufficient confidence in them.

As a general rule, bed-rooms and living-rooms should have restful and soothing colour, such as green, blue-green, blue-grey, etc., unless they are in the north. In the latter case, a cream, pale primrose-yellow, lime-green would be more suitable. The dining-room should have a lively colour such as pale pink, rose, yellow, orange, etc., with a certain stimulating note. The kitchen should also have lively colours, but, for practical reasons, such colours as would not be soon spoiled by smoke, such as buff, blue-grey and smoke-grey, etc., should be used. The bath-room should have fresh, clear, and stimulating colours such as ivory, cream, etc., with notes of stimulating contrasting colours. If white glazed tiles are used for the dado in the bath-room, a coloured border should be provided, or the upper surface of walls and ceiling may be coloured in a shade of a warm colour like rose so that it would be reflected by the tiles, and the room would be made to look cheerful.

WINDOW TREATMENT

The function of windows is to let light and air into rooms. The modern trend is therefore to keep the entire glass space uncurtained. A pair of ruffled curtains crossed over the window at top, and held back in curves, with blinds hung from unobtrusive poles and rings, to be pulled only when privacy is required or to exclude the evening sun is sufficient.

The characteristic of draperies is the cut, colour combination and trimming. The material used is of secondary importance. Any inexpensive fabric of matching fast colour, will serve. Elaborate patterns if used, cannot be seen in the braids, plaiting and folds.

One colour should dominate, e.g. if beautiful flowered chintz is used as the inspiration of the whole colour scheme, draperies may be of plain chintz in the same colour.

Furniture and Furnishing

HOME furnishing forms a part of the interior decoration and must be considered in relation to all the aspects of the latter, viz., size and shape of rooms; positions of doors and windows; sources, direction and intensity of light; colours of walls, floors and ceiling; colour and texture of curtains and draperies, etc.

However, by far too large a number of people crowd their rooms with furniture collected at random without any regard to its fitness, comfort, or even form. Some buy it just to impress their friends. When these people think of furnishing their homes, they rush to a furniture shop, pay a high price and strike a bargain of their entire requirements in a few hours. It is no wonder if they have to repent for their choice afterwards because they did not consider the matter from the point of view of their specific requirements. As a matter of propriety, every piece must be planned to fit the walls and spaces and the sizes of the rooms it is to occupy. The pieces of furniture should be few, but well chosen as regards their beauty, strength, and utility.

Unlike other forms of decoration, such as the colours on walls and ceilings, curtains and draperies, pictures on walls, etc., which appeal to us only through the sense of sight, furniture does so both through the eyes and touch—we live with furniture, we handle the individual pieces, we sit in chairs and sofas, lie in beds, and write on or eat from tables. Hence, furnishings must be considered not only from the point of view of beauty, but also from utility or function. Beauty in furnishings comes through graceful lines, good proportion, lovely wood-grain or pleasing colours, and the functional needs or utility includes usefulness, appropriateness or fitness of purpose and durability. In modern times, functional needs also include ease, labour-saving, and economy in maintenance. For instance, brass fittings for doors and windows must be polished every now and then. If fittings of stainless steel, or chromium-plated or even oxidised brass or steel are substituted, the latter do not require any care for an indefinite period; glass-topped tables and teapots require very little cleaning effort, and so on.

The design of furniture should be dictated by common sense and good taste. The object of furnishing a home is to give comfort to the body, pleasure to the mind, and to conduce to the preservation of health. A chair, for instance, to be comfortable should have a sufficiently spacious seat and should amply support the back; to satisfy the requirements of good taste and to

please the mind, it should have a graceful form, and the colour of the body and of the cushion should be in keeping with the general scheme of decoration of the room. In order to be conducive to sanitation, it should be free from any carving which does not add to the comfort, but only increases the cost and further acts as a depository for dust and dirt. Its legs should be strong and plain and not twisted or curled. Its seat should not be covered with velvet (which catches dust and is difficult to clean) but with leather—real or artificial—or some such material, having a pleasing colour and a plain surface. This functional test can be applied to every piece of furniture. As another instance, among sofas, that sofa will be the best, which is least bulbous and clumsy in contour, which has the least ornate carving, the fewest buttons and fringe. The one with flowing graceful lines, well-proportioned height to width, and with slender graceful arm appears best.

The essence of modern furniture is simplicity without ornament. Its shape is all-important with clean-drawn contour, beautiful proportion and the best functional utility.

For the requirements of health, every piece should be light so as to be easily removable; or if bulky, it should have means to permit the floor below being cleaned and washed. It should, for this purpose, be preferably supported on castors which would allow it to be moved aside so that not only the floor below, but also the wall behind, may be cleaned. It should have not only no carving but not even small recesses in which dust is likely to collect. Further, in respect of furniture, as in everything else, shams and pretensions should be avoided. They are bad in taste, bad in art, and bad in moral sense. Few persons would believe that a concrete staircase painted like marble is of real marble.

With all the improvements that are being made every day in various trades relating to furnishing material, and by exercising common sense and good taste and with a careful regard for use and suitability and avoidance of all that is sham and false, we may make our homes not only comfortable and healthy, but artistic and beautiful as well. The general effect of furnishings should be that plenty of free unobstructed space should be left for easy movement. In planning rooms, therefore, include only the essential and when the background and lighting are decided upon—at least temporarily—consider the individual pieces which will fit well into the spaces.

Here is a list of common furniture used in different rooms.

ENTRANCE VERANDAH.—A closed closet with coat hangers, hooks, shelves for hats and shoes, sandals, etc., racks for umbrellas and canes, and pegs for wraps and rubbers, with a mirror in front. A thick coir mat to catch

dirt from shoes before it is carried to other rooms. A few pictures of general interest, such as landscape views hung on walls. If the verandah is used as a waiting or sitting-room, provide also a few reed or wicker couches with cushions, chairs, a desk for newspapers and one or two teapots, etc.

RECEPTION ROOM.—This is the show-room of the family and should be decorated formally. Rich formal furnishing, heavy draperies, paintings, deep pile rugs, etc. are suitable.

LIVING-ROOM.—This is the common meeting room of the family. Book-shelves, desk, side-board, cupboards, radio, chairs, settees, etc.—all informal furniture, neatly but informally arranged with emphasis on comfort, friendliness, and sociability.

BED-ROOM.—Bed, dresser, bedside desk, one or two chairs, chaise lounge, etc., and if there is no separate dressing-room, provide also clothes closet, complete with rods, hooks, hangers, shelves, etc., dressing-table, mirror, wash-hand basin. Colour and decoration should be restful and soothing.

DRESSING-ROOM.—Clothes closet, dressing-table with mirror, lavatory basin and good light.

DINING-ROOM.—Plain walls with fruit or floral designs or landscape pictures and cheerful colours. Dining-table, chairs, china cupboards, side-board, serving-table, etc., all pieces including the floor, capable of being easily cleaned with water.

KITCHEN.—The furniture and equipment have been already described in detail under "Grouping."

LIBRARY.—Plenty of wall space for book-shelves. The latter may preferably be inside walls. 65 per cent of shelves should be 9" high and 6" deep, 25 per cent 10" high and 8" deep and 10 per cent 12" high and 9" deep. Comfortable chairs, desks and good lamps placed at the side or to the back of the reader, good daylight without glare, breeze, coolness and comfort—are all conducive to concentration of mind.

The choice of pictures in rooms is a personal matter. However, it is better to hang only a few on the walls at a time, storing the surplus and changing them occasionally. The same remark applies to ornaments such as vases, statues, etc.

If the radio bought in the market be not of a colour- and design to match with the scheme of decoration, a cabinet of the proper design should be made and the radio enclosed in it.

If the windows be not of the desired shape, curtains and pelmets may be used to frame them so as to alter their shape.

Fitting Fabric to Furniture

Upholstering fabric, besides providing a durable wearing surface to furniture, forms part of a colour scheme. The fabric affects the scheme in two ways: its pattern, and its texture. If the pattern is far-spaced and deliberate, it gives distinction to the room. A rough red-and-white checked linen, on the other hand, will make it gay and informal. Effective and beautiful pattern, harmonising with the basic colour scheme, and general character of the room should be selected.

A room decorated entirely in plain surfaces appears poised, serene, and formal. If however, patterns of flowered chintzes for draperies, couch, and chairs are used, it will become gay and cosy.

In planning the colours and patterns of walls, upholstery, drapery, and rugs, make one of these areas dominant in importance. For example, if oriental rugs presenting a large surface are used, they will dictate the colour choices of the other items. If prominently printed fabric of large motif is used for slip covers, plain rugs, and draperies would provide a harmonious background. In India wall papers are seldom used. Hence the background of walls is always in plain colour. If one of the fabrics covering a large surface shows a prominent floral design, fabrics with small pattern or thin stripes may be used for covering accessories; e.g. if the bed-spread is large-patterned linen, of say, red-and-white flowers, the chairs may be with red-and-white dotted chintz, or fine red-and-white stripes.

Fringes and braids should be used sparingly. The same edging should appear on not more than two or three pieces of furniture.

Complete seasonal alteration of colour scheme, with new arrangement of the same furniture, with new slip covers and draperies is also possible to give added zest, at a small extra cost, if it is planned at the same time as the original colour scheme, using heavy, warm fabrics in winter, and light, cool materials in summer.

If fabrics of the desired colour are not available in the market, it is safe to upholster all the furniture in the same basic colour, and vary the texture, by having some rough, some smooth, and one or two in toned effect.

While re-covering one or two pieces of furniture, if the original fabric is not available, use new fabric having the colour already established, with a slight variation in the pattern, rather than a new disturbing colour added.

PLANTS AND FLOWERS IN ROOMS

In Western countries, a decorative effect is obtained by cultivating plants in flower-pots and arranging bouquets of flowers on tables inside the

rooms. This is a very good practice and should, by all means, be universally adopted in our country. Not only do they give an appearance of freshness and liveliness to the room, but also help to purify the air during the day-time. Their action on air is, on the whole, the reverse of that of animals.

It is true that plants respire like animals, breathing in oxygen and giving out carbonic acid gas. But this process of respiration is very slow and is hardly perceptible during the night. On the other hand, the respiration during the day-time is very insignificant with the reverse process of assimilation, in which the green matter in the leaves actually decomposes the useless carbonic acid gas under the influence of light, and gives out a large amount of oxygen for the benefit of animals. On the whole, the presence of green plants inside the house is very beneficial. The air inside the house is charged with a certain amount of smoke, which contains some elements such as sulphur compounds, particularly in the house where gas is used for cooking and lighting purposes. These are detrimental to the plant life. There are only a few plants such as a few varieties of cactus, certain plants, and a few ferns which possess the power to resist these evil effects.

Apart from the physiological effect, as explained above, of plants inside the house in respect of purifying the air, the psychological and moral effect on our minds is certainly invaluable. Every glance of ours at the fresh foliage of plants or at the pleasant delicacy and cheerful colours of flowers, is accompanied by an involuntary pleasurable emotion which stimulates even the depressed mind. It is a common experience that a child even before the age of reason, stops crying at the sight of a beautiful flower and instinctively spreads out its hand to catch it. Our environment has so much to do with the shaping of our lives and disposition. Then why should we not make them cheerful if it can be done without much labour and expense?

Thus it is possible to make a small conservatory or a fernery on a side of the verandah, or on the open terrace on the rear side where children play. It is possible to make hollow concrete boxes in the extension of window-sills on the outside and to grow flowers in them. It is also possible to make boxes of concrete for plants in the top-layer of the parapet walls of terraced roofs for roses and other flowers. A garden of small beds of flowers in earth spread and shrubs grown in boxes could be successfully made on top of terraced roofs, which would be most enjoyable for poor families who cannot afford the luxury of a garden in the cottage compound. These are moreover protected from the inroads of goats and urchins.

Flower arrangement is an art in which the composition of colours, line direction, masses of foliage, and dark and light pattern are used to create the best effect. This art is developed into a science, and books have been written

on it in Japan, where it is taught as one of the compulsory subjects in girls' schools.

For the real artistic use of flowers in home decoration, they must form an integral part of the colour scheme. This, however, is very difficult to achieve, since flowers of the proper colour to suit the basic colour scheme may not be available all the year round.

Their importance as informal, casual decoration also, cannot be minimised. They bring the feeling of the garden indoor, and give a sparkle of colour to any decoration, informal or sophisticated.

A bouquet with its exquisite balance of unsymmetrical form, or a combination of varying forms and colours grouped in symmetrical masses of delicate and lively colours, placed on a radio, centre table, or against a mirror is sure to add freshness and charm, and intensify the entire setting.

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Insulation or Heat-Proofing

THE FUNCTION of insulation is to retard the passage of heat through walls, floor, and roof of the house. When the outside air is colder as in the winter, heat tends to flow outside, and when it is hotter as in the summer, it flows into the house.

In Europe, the summer is very mild and, therefore, they do not necessarily require insulation for summer conditions, but in winter, if the house is not properly insulated, a large amount of heat within the house escapes and increases the bill for coal, gas, or electricity used for heating air. In many parts of America, the summer is as severe as here in India, and the winter, too, is as severe as in Europe and, therefore, they have to be very particular in providing proper means of insulation, which, even though initially very costly, pays them in the long run as it helps them in both the summer and winter. The item of insulating the house is as necessary and important in their construction estimate as the foundations, walls, and the roof.

Our problem in India is a very simple one. Except on some hill-stations, we do not require fires in the winter. We want insulation for summer conditions only. The method employed hitherto such as providing a wooden ceiling below roof and *khus* curtains in windows has been quite unsatisfactory. But, with the advent of air-conditioning, which is sure to be commonly adopted in the not too distant future, systematic efforts at insulating the house would be necessary; otherwise, the recurring cost of air-conditioning would be very heavy. Hence, it is proposed to deal here with the latest methods of insulation a little in detail.

It should be noted that even though insulation may be necessary for summer conditions only, it is bound to help during winter also in keeping the house warm and enjoyable.

We have seen in an earlier chapter while discussing orientation of houses (pages 18-20) that the main cause of discomfort in summer is the fact that the roof and outer walls of the house absorb heat from the sun's rays and radiate it inside. Therefore, if a layer of some insulating material is interposed between the outer and inner faces of walls and just below the roof so that the heat rays absorbed by the outside surface are either cut off or reflected away before they reach the inner surface, our purpose would be eminently served. Air itself is a very bad conductor and, therefore, if a

sealed cavity is formed inside the thickness of the wall and the roof, it should, in theory, prove a very good insulator.

But there are practical difficulties, more particularly under the roof, of properly sealing the cavity so as to make it perfectly air-tight. If this is not accomplished, i.e., if the cavity is in communication with the outside and inside air, the air in it absorbs heat or cold and no longer serves as an ideal insulating medium.

The modern methods of insulation may be classified into four main types:

- (1) Blanket type.
- (2) Loose-fill type.
- (3) Board type.
- (4) Mirror type.

It may be mentioned here that all these types are suitable for the method of construction of walls which is rarely practised in India. However, we can very easily adopt them for insulating our roofs. In fact, a roof, particularly a tiled one, radiates more heat than walls of the ordinary thickness built in our country.

The method of constructing walls practised in the Western countries is this: The entire weight of the floor or floors and the roof is supported by a framework of vertical "studs" or posts, erected two to four feet apart, either of timber or steel, and on both sides of these studs is fixed lath-work, either of metal or wood, which is plastered with cement. In other words, even the outside walls are only three to six inches thick with an inside cavity equal to the thickness of the studs. Sometimes these hollow walls are constructed with the outside covering of either wooden boards (shingles) nailed to the studs or a four inch brick-in-cement wall (brick-veneer), and the inside covering of lath plastered with cement as usual. In any case, the outside walls are thin, requiring very light and inexpensive foundations. The entire reliance for heat-proofing is, therefore, placed on the insulating material used inside the cavity. Our practice in this country is to build solid walls and depend upon their thickness for heat-proofing.

MODERN METHODS OF INSULATING A HOUSE

(1) In the Blanket type, there is a regular blanket, or rather a quilt, made of any loose, fibrous material like sea-weed, loose coir, mineral wool, wood-fibre, etc., spread between two layers of tough (building) paper and stitched just like cotton quilts, and formed into rolls usually in two widths sixteen inches and four feet. These rolls are unfolded and tacked to the

framework of the studs by means of thin wire nails. In roofing, the wider rolls are nailed direct to the rafters after stretching them properly and the ceiling boards are fixed above on which tiles may be laid as usual on battens. The quilt is usually one to two inches thick.

(2) In the Loose-fill or bulk type, loose insulating material, fibrous, granular, or powdery, is either poured, blown, packed or filled under compressed air as necessary into the cavities inside the walls or under the roof. As the thickness of the cavity is considerable (two to four inches), this type proves a very effective insulator.

The material can be filled into the cavities of the outer walls through holes at the top, or may be packed by hand as the wall progresses, but in roofing it must be packed on the top of the ceiling boards before the tiles are laid.

In moist and damp localities, it is likely that the moisture or water vapour may condense and not only reduce the insulation value of the material, but also set a rot in the loose material itself and also in the wooden framework of the wall, besides causing foul gases to emanate. It is, therefore, necessary in such localities to provide proper means of ventilation inside the wall so that if air circulates, the water vapour also moves out with it or dries up.

In the above two types, the mineral fibres such as rock-wool, glass-wool, etc., have one special advantage over the vegetable fibres such as seaweed, wood fibre, etc., viz. that the mineral material is fire-proof, vermin-proof, and also rot-proof.

(3) In the third type comes the material consisting of insulating boards, either rigid or flexible, from one half to two inches thick. They are made of wood-fibre, suitably treated, and compressed between rollers so as to form large sheets which can be used in several different ways. The rigid board on account of its stiffness, can be used as a structural material, for instance in the place of lath-work or as ceiling boards under the roof. The insulating board, whether rigid or flexible like thin cork sheets, can also be used as a plaster base, applied to masonry walls by cementing or nailed to a wooden frame. The variety of insulating boards which has a smooth finish can be used also as an interior finish to walls making plastering unnecessary. Thus, besides insulating, the board type of insulating material serves another purpose also.

(4) The principle involved in the Mirror type is quite different from that of the above three types. It is based on a law of physics, viz., that if a ray of heat impinges against a polished surface, it is reflected back toward the source of heat, it not only effectually cuts off the heat but causes it to be

reflected away. It is not necessary that the surface should be bright. A single curtain of reflecting paper is sufficient, though usually two or more curtains are used to increase the insulating effect. The action of the paper curtains is two-fold. The first is mechanical in so far as the metal-clad paper is very tough and, if tacked well to the frame-work, effectually seals the cavity and traps air inside, which itself forms a very good insulator. The second is optical, and the paper curtains reflect away the rays of heat.

If it is desired to insulate a house with the present methods of constructing solid walls, it is necessary to do the following:

- (1) Insulate the roof by adopting one of the methods mentioned above.
- (2) Keep the doors and windows in the outside wall closed during hot hours, and provide them with either
 - (a) Properly weather-stripped wooden shutters, or
 - (b) Panes of a special kind of glass such as "Calorex," which are often used for windows of the first class railway carriages. They admit light but cut off most of the heat, or
 - (c) Double panes of ordinary glass which, with the film of air between the two panes materially cut off the heat rays.
- (3) Build walls of such material as absorbs heat least and radiates it most readily.

Amongst building materials, metals are the best conductors of heat and, therefore, absorb heat and also radiate it most readily. Brick absorbs more heat than stone but also radiates it more easily. Stone is a bad conductor of heat, but once it absorbs it by long exposure, it is very slow and reluctant to part with it. Earth or clay is a still worse conductor. Therefore, walls of unburnt clay or of *pise de terre* make the house cool and comfortable. That is also why mud roofs are cooler than concrete terraced roofs which, again, are cooler than tiled ones.

The colour of the surface exposed to the sun's radiant heat has a great effect on comfort. White absorbs the least heat, and whatever little is absorbed it radiates again most readily. Its opposite extreme is black, which absorbs heat most and is very slow in radiating it. Intermediate between these are yellow, grey, green, blue, and red, in the order of absorption, i.e., yellow absorbs heat less and radiates it sooner than green, and so on. White-washing the exposed surface of walls and roof is an effectual remedy, but it causes a glare. Grey or khaki (hay colour) is, therefore, the next best so far as insulation is concerned.

Even a galvanised-iron sheet roof can be considerably improved in respect of heat by spreading grass, either loose or in the form of a mat, on its top. Even a thin bamboo matting on its top affords considerable protection. It does it in three ways: firstly, it possesses considerable insulating property, secondly, it reflects away the heat rays from its yellowish, shining surface as the metal-clad paper does, and thirdly, it casts a shade on the metal surface.

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Air-Conditioning

IN ITS present highly specialised form, air-conditioning has developed very recently, and during the past few years in particular, it has made such great strides and such new discoveries, while improvements are being made every day, that it promises to be very cheap and come within fairly easy reach of the middle-class people in the not-very-distant future.

“Air-conditioning” a room, in plain, simple words, means artificially creating such conditions of the air inside the room as would give maximum comfort. Now, what are the factors which make us feel comfortable? We know that circulation or movement of air is one. It is our every-day experience that on a hot or sultry day, when we sit in front of a fan, we feel comfortable. But if we analyse the causes of this comfort, we shall find that it is not the movement of the air alone, created by the fan, but something more which is responsible for the comfort. The hot and sultry air caused us to perspire to a more or less extent, and it is the evaporation of this perspiration by the movement of the air that cools down the temperature of the air in the immediate vicinity of our body-surface and gives us the feeling of comfort. Thus we know that (a) the movement of air and (b) the lowering of temperature are necessary for comfort. There is also a third factor, viz., the moisture or water vapour present in the air which affects our comfort. Everybody knows that in a coastal place like Bombay or Madras, though the temperature be not high, it is the amount of water vapour with which the atmosphere, due to its proximity to the sea, is charged that makes us feel oppressive, particularly when the air is still. Thus water vapour in the atmosphere, or what is called “humidity,” is a third factor—and perhaps more important than the other two—affecting our comfort.

Now according to a law of physics, the maximum amount of water vapour which the atmosphere can hold, depends upon the temperature. It increases with the rise and decreases with the fall in temperature. Thus, supposing that the atmosphere is saturated with water vapour at a certain temperature and that by some cause the temperature is suddenly lowered, then the water vapour in excess of the capacity at the lower temperature is condensed and separated and falls to the ground. This is exactly how we get “dew” and even “rain.”

Scientists have found by experiments that the requirements for the optimum comfort of the human body for Indian conditions are: a range of temperature between 76° and 82° F. and the relative humidity between 60 per cent and 45 per cent respectively. This means that the greatest comfort is caused when the temperature is, say 82° F., and at the same time the amount of water vapour present in the atmosphere is 45 per cent or about 5 per cent less than half of the maximum which it could hold at 82° F.

Thus for getting maximum comfort we must secure the following:

- (1) To maintain the temperature between 76° and 82° F.
- (2) To maintain the relative humidity at 60 per cent to 45 per cent.
- (3) To cause the air to circulate.

But, if the same air in the room was circulated round and round again, the oxygen in it would soon be used up by human respiration. Therefore, in the course of the circulation, some vitiated air must be expelled and fresh air brought in to replace it continually.

Further, the movement of the air inside the room must be at such a speed that no perceptible draught would be felt.

Perfect air-conditioning not only seeks to do all this with automatic controls, but even a little more, viz., it filters or deprives the air, before it is admitted into the rooms, of all particles of dirt and dust which, while floating in the air, carry a large number of harmful bacteria.

By the way, the filtering of air so as to eliminate dust and other matter is very beneficial to asthmatic patients.

In the process of making this accomplishment, we automatically secure one more advantage, viz., the insulation of sounds. It is this wise: For proper air-conditioning, all the doors and windows have to be kept closed—the windows exposed to the outside air with double-glass panes, if necessary—and this effectively shuts out all the outside noises.

If all-the-year round air-conditioning is sought to be accomplished,

- (a) *In winter*, the air is much cooler than the comfort zone of temperature, viz., 76° to 82° F., and, therefore, it contains much less moisture, also than the relative humidity at the comfort zone; hence we have to,

- (1) Heat the air;
- (2) Humidify it or add moisture to it;
- (3) Filter and force it into the room for proper circulation.

(b) *In summer*, we have to,

- (1) Cool the air;
- (2) Dehumidify it or extract moisture from it, and
- (3) Filter and force it into the room for proper circulation.

The third factor is common to both the cases.

The cycle of operations involved is shown diagrammatically in Fig. 36.

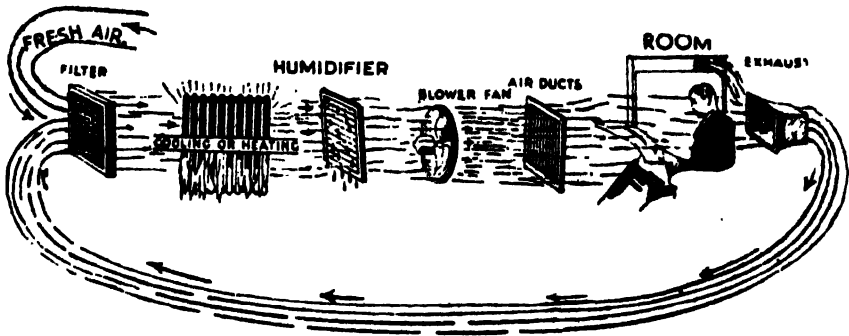


Fig. 36.

With these general facts as a background, we shall now discuss the different methods of accomplishing this.

India being a tropical country, our problem is mostly one of summer air-conditioning only. So this would be discussed in greater detail here.

Before proceeding to describe the methods of summer air-conditioning, it would be well to sound a note of warning. When the outside temperature is high, the atmosphere of an air-conditioned room should never be so cool as to cause even a slight chilling effect to one entering the air-conditioned room from outside. Normally, the difference between the outside and inside temperatures should not exceed 15°F. in the case of rooms likely to be occupied for a short period of two or three hours (such as restaurants, theatres, etc.), and 20°F. if the room is to be occupied for a long period, as in a residence or in an office. This is necessary in the interest of health.

One is apt to think that this is a serious hindrance in the way of air-conditioning at places where the temperature in summer is high. For instance, there are a number of places in India where the temperature in the summer is as high as 115°F. in the shade, and if it be positively harmful to

lower it below 100° F. inside, there is no use of air-conditioning at all, as this is 18° higher than the highest limit of the comfort zone (viz. 76° to 82° F.), but it is not so. It is the common experience that to those accustomed to a temperature of 115°F., 100°F. gives as much comfort as 82°F. temperature gives to people living in temperate climates. Again, the heat at such places on the plains is too dry and parching and, therefore, if by air-conditioning we introduce the correct relative humidity and further keep the air in motion, we feel as comfortable and still healthier without a low temperature inside.

For efficient and economical air-conditioning, it is necessary to insulate the whole house or, at least the rooms to be air-conditioned. As this subject is treated under a separate chapter, no repetition is made here.

The methods of air-conditioning depend upon several factors such as the budget (both initial and annual), the temperature, humidity, the insulation made, materials available, and so on. Again, it can be either complete or partial. If, for instance, the temperature of a place is not high, and at the same time there is sufficient moisture in the air, though not quite up to the standard of the comfort zone, then a mere artificial air circulation may be sufficient. Again, if the temperature is not high, but the humidity is too much, then dehumidification alone may be effective.

The cheapest and a fairly efficient way of partial air-conditioning is by the method of what is called "cooling by night air." This method lends itself particularly suitable to the plains or, in fact, to all the places in India, except those in the coastal region where the atmosphere contains too much moisture.

The method consists in mounting a fan of suitable size just in the loft below the roof, and working it by night. A square or circular staircase built centrally in a house extending in a tower or a dome at top with windows on opposite sides for cross ventilation, would provide an ideal place for such a fan, and the results, too, would be very satisfactory. The way in which it works is this:

Soon after nightfall, the outside air becomes cool, but the roof, walls, and every solid thing, both inside and immediately outside the house, which have absorbed heat during the course of the whole day, begin to radiate it and make the rooms a veritable hot-house by night. This they continue to do almost till the small hours of the morning, making it impossible for the inmates to enjoy a restful sleep. Now, if the windows of the ground-floor be opened just as soon as the outside air begins to cool down, and if the fan is set working, it would draw up the outside air through the entire house and cool the latter down appreciably in a short time and contribute to the comfort of the inmates. As the night advances and gets cooler and cooler, the

air from outside, being sucked in by the fan, would materially reduce the temperature of the surface of the inner wall and floor and everything inside the house. If, upon rising in the morning, all the windows and outside doors are again closed and kept closed, as far as possible, during the whole day, and the fan also stopped it would be a long time before they absorb heat again. In this way, throughout the day also, the inside air of the house would remain cool and comfortable, and thus our object would be attained.

It would be sufficient if the fan is operated only for a few hours, say till midnight and then closed. If electricity is available, it would be the easiest thing; if not, it is possible to work it even by manual labour, if some suitable gearing is introduced. We normally employ a *punkah*-puller just to cause a movement of air in a single room. Here the entire house could be cooled in a much more efficient manner, and possibly within the same expense.

Another slightly more expensive but equally simple method is to cool the air in a closed room by evaporating water—say, by exposing a continually wetted cloth-surface to a revolving fan, and then to dehumidify the air by utilising some chemical such as lithium chloride, etc., which possesses the property of absorbing moisture.

As to the methods of systematic air-conditioning under proper controls they are many. They can, however, be classified into two divisions:

- (1) *The central system.*
- (2) *The unit system.*

The principles involved in either are the same, viz.,

- (a) Sucking the air through filtering media,
- (b) Cooling (or heating) it,
- (c) Dehumidifying, if it is to be cooled (or humidifying, if it is to be heated),
- (d) Forcing it into the rooms for proper circulation through grilles, and finally,
- (e) Collecting the used air through an exhaust to be mixed with some outside fresh air also and sucked again through the filtering medium, thus completing the cycle.

The only difference between the two systems is that whereas in the central system, (i) the different operations are performed at different places, and only the conditioned air is supplied to rooms through regularly constructed concealed ducts mostly at the ceiling level, in the unit system, (ii) special, portable, attractive cabinets of a design to fit in with the decoration of a modern room, are placed inside the room. They are self-contained in every respect, perhaps, in some cases the condensing unit (an electric motor or an

engine and a compressor) is placed somewhere away in a cellar or a closet, and a pipe carrying either a refrigerant or refrigerated water is connected to it from the cabinet. In both the systems, the temperature is controlled automatically by means of a thermostat, and humidity by means of a humidistat.

Figs. 37-39 show diagrammatically the two systems of air-conditioning.

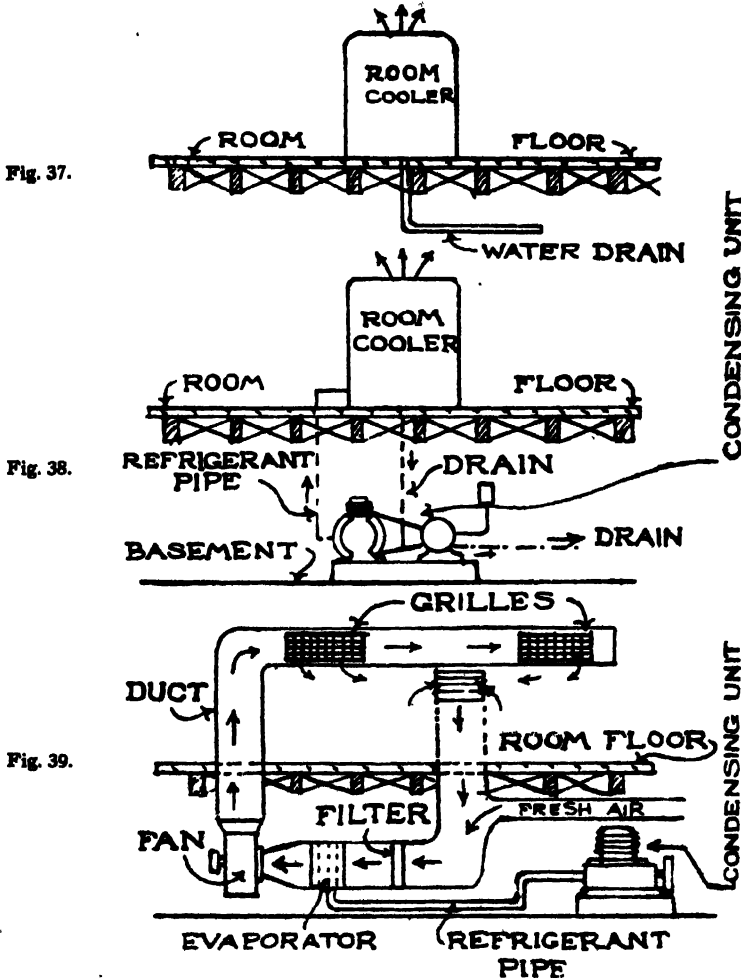


Fig. 37 shows an air-conditioning unit, self-contained in every respect, placed on the room floor. There is a pipe under the floor to drain off water from the cabinet. Recently great improvements have been made in these. They are available of the best Indian manufacture resembling a radio in

size and decorative effect, to be installed at floor level in a wall. No drain pipe is required.

In Fig. 38, the conditioner is not self-contained. Its condensing unit, viz., an electric motor or engine and a compressor are somewhere away on the basement floor, and a refrigerant and drain-pipes are connected to it.

Fig. 39 shows the central system of air-conditioning. The condensing unit with evaporator and fan are all stationed in the basement floor, and cooled air is carried by ducts to all the different rooms in the house.

The filtering medium used is any fibrous material, such as spun-glass, steel-wool, porous paper, wood-fibre, cloth, etc., either dry or wetted with oil; so that the particles of dust should adhere to it.

Sometimes, instead of using filters, a spray of water is ejected into the path of the air current, and thus the air is literally washed of all dirt and dust. This washing helps either humidification or dehumidification, as the case may be. For, if the water used is warm, the air is heated and, therefore, absorbs moisture from the spray. If, on the other hand, the water is cold, the air, while being cooled, gives up part of its moisture.

The cooling is effected in several ways: by water, air, chemical sprays, and refrigerants, etc.

One very cheap method of cooling by water is suitable when a deep well is close to, or inside the house. The water of a deep well is usually cold enough. It is pumped and forced into a cooling coil which is placed inside the duct carrying the filtered air. The latter, when cooled, loses some of its moisture, and thus both cooling and dehumidification take place, and the pumped water, after it cools the air, is allowed to return to the well.

Another method which is cheaper as regards initial investment but costlier in maintenance, is to melt ice with a spray of water and pump the water into cooling coils.

By far the commonest method is to cool the air by means of one of the refrigerants, such as methyl chloride, freon, etc. In large-scale air-conditioning plants, the power unit (an electric motor or oil engine or steam engine) and a compressor are installed in the basement as in Fig. 39, and either the compressed refrigerant itself is pumped into coils for cooling the air directly, or water is cooled by allowing the refrigerant to evaporate, and then pumped into coils. In the self-contained units, a small electric motor does all this inside the cabinet.

For winter air-conditioning, instead of a refrigerant or cooled water, steam or hot air is introduced into the ducts by means of separate heating coils.

Sound-Proofing for Privacy

THE MODERN practice is to build only the outer walls thick enough to resist heat and also afford protection from burglars, and to build all the inner walls as partitions of a thin section. This effects economy, both of space and money, but possesses two disadvantages, viz., (i) that no wall cupboards can be provided, and (ii) that sound is likely to be transmitted from one room to the other across the thin partitions, unless they are made sound-proof by some special means. In fact, the first is not a disadvantage as is commonly supposed, because closets with thin walls as described on page 55 which are more efficient than wall-cupboards and even removable wardrobes, could be easily provided. Both these occupy less space and can be made at considerably less expense than a solid wall built right from the foundations simply for the sake of wall cupboards, as many people thoughtlessly do. However, the second disadvantage, viz., that sound is likely to be transmitted through the thin partition, is real and must be remedied. Privacy in respect of sound is necessarily required in bed-rooms, bath-rooms, sanitary closets, study-room and the prayer-room, otherwise much of the pleasure a home is expected to give is lost.

The science of sound-proofing has made such great strides of late that it is possible to eliminate all the noise by means of even a thin partition. In Radio City, in the Rockefeller Centre Building, New York, a brass band playing in one studio is absolutely unheard in another studio in adjoining room. This is, however, very expensive to accomplish. What is aimed at normally in a home is not the complete elimination of sound, but reducing its intensity and making it unintelligible, and this can be done very easily at a small expense.

It is commonly known that sound causes vibrations at its source. These vibrations set up waves in the air, and it is these waves which travel from one room to another. Now these waves may pass directly through key-holes, chinks, and cracks in the door-openings, even though the shutters may be closed, or they may strike the surface of the partition and set up vibrations in the particles of the material of the latter, and may be reproduced at the opposite face. In the first case they pass unimpeded, so that the sound in the adjoining room is distinctly heard. In the second case, much depends upon the material forming the partition. If it be soft and resilient, like cork,

rubber, etc., or of a spongy, loose fibrous nature, the waves striking the material are damped and distorted and the result is that the sound reproduced on the opposite side is low and unintelligible.

The surface treatment of walls has a great effect on sound transmission, and for this reason a lining of felt or cork is used on the inside surface of the walls in a wireless studio. But it is out of the question for homes, as such a surface is bound to collect dust and be difficult to clean and is moreover expensive. The question, therefore, reduces itself to constructing a hollow partition and to filling the cavity with a loose material of a powdery, granular, or fibrous nature which is less resonant, so that the sound waves may be materially damped before they reach the other surface of the partition. Here again, as in insulating against heat, material of a mineral origin is to be preferred to that of vegetable origin. The Loose-fill type of insulation and, to a certain extent, the Blanket-type, also described on page 103-104 would provide reasonable sound-proofing also. A hollow partition, i.e. a partition with its cavity filled with air, does not help sound-proofing, on the contrary serves as a sound box.

To recapitulate, all key-holes, chinks, and crevices must be properly closed, and cavities must be provided inside the partition walls and filled with some loose material; this would afford sufficient privacy in respect of sound ordinarily required in homes.

Artificial Lighting

THE OBJECT of lighting is to see things distinctly and with ease and comfort. Though the organ of sight has marvellous powers of adaptation to changes, it is overstrained when severe contrasts in brightness or very sudden changes in the intensity of light occur. The requirements of an ideal lighting installation are:

- (1) Steadiness of the source of light.
- (2) Elimination of glare.
- (3) Avoidance of shadows.
- (4) Sufficiency of illumination to suit the nature of the visual task.
- (5) Non-production of excessive heat.
- (6) Minimum consumption of oxygen from the air.

(1) There should be no appreciable fluctuation or flickering of light which overstrains the eye.

(2) Glare of the vision is likely to occur if gas or incandescent electric lamps are used. It may be remedied by (a) Placing the source of light high above the level of the eye, so that it is not ordinarily seen, and (b) Screening the light by means of a suitable shade, or interposing frosted or opaque glass, silk, celluloid, etc., so as to diffuse and soften the light.

(3) Inconvenient shadows can be avoided by (a) Proper shading of the source of light, (b) Using light colours on walls and ceilings which reflect and diffuse light in all directions, and (c) Providing a general mild light to illuminate the entire room, and one or more stronger lights, in addition, at proper places for specific purposes such as reading, sewing, etc.

(4) For the comfort of the eye and efficiency of the particular visual task, the proper degree of illumination is required. Thus, reading requires more light than playing at cards, and for sewing more light is required than for reading.

(5) Production of excessive heat is a great disadvantage in a tropical country like India, particularly in the summer.

(6) Except the incandescent electric light, every other source necessarily consumes oxygen from the air.

Electric light (except the arc-light which is now rarely used) is the best, as with proper shades and reflectors it fulfils all the above conditions.

However in India, except in cities and a few large towns where it is available at present, people have to depend upon oil lamps for ordinary use, and gas lamps on ceremonial occasions.

When oil lamps are used, it is customary to keep a small lamp burning the whole night inside a bed-room. Even though its flame may be turned down very low, it is sure to vitiate the air in the bed-room where, generally, the arrangements for renewing it are imperfect. It acts adversely in three ways: firstly, it consumes part of the oxygen from the air. Secondly, it produces carbonic acid gas, water vapour and heat. Though these may be in small quantities, if the flame be very small, still the combined effect is of no small consequence. Thirdly, the imperfect combustion, which is the necessary result of the low flame, fills the atmosphere of the room with myriads of particles of soot. Anyone entering such a room, shut up with a burning light for a few hours, will easily perceive it by smell.

With electric lights we have a choice of three different methods of lighting:

(1) Direct lighting, in which light is derived directly from the lamp without any interruption or diffusion.

(2) Indirect lighting, in which the source of light is completely shielded, and its rays are first thrown on the ceiling and the upper portion of walls, whence they are reflected and diffused throughout the room.

(3) Semi-indirect lighting is a combination of both the above principles—part of the light is uninterrupted and part thrown on to the ceiling and walls, and thence reflected.

In India, as electricity is fairly expensive so far, the first method is in general use, though it is being gradually superseded by the second in cities where electrical energy is growing cheaper and cheaper.

With a reflector on a shade on the top and direct light below, maximum lighting power is used in the first system; still the eye very often sees the brilliant filament inside the lamp, and is strained.

With indirect or semi-direct lighting, glare is eliminated. The diffusion of light from large surfaces gives soft shadows, causes the light to penetrate into every corner, and avoids inconvenient reflections of light from polished metal or book-surfaces. But it consumes more than twice the electrical energy required for direct lighting. Hence it has so far been a luxury which only a very few rich families can enjoy.

The efficiency and economy of indirect lighting depend upon two things—firstly, a scientifically designed reflector of proper material, and

secondly, a flat, plain ceiling and walls, light in colour and with a matt finish. If the ceiling surface is broken up by ornamental decoration, it reflects less light, and if the surface finish is not matt but shiny, a bright image of the source of light is seen in it which, just like directly exposed light, strains the eye.

Semi-direct method possesses advantages of both the direct and indirect lighting. There are fittings available in the market, so designed that the proportion of direct and indirect light can be regulated to suit our requirements with the two systems independently switched, so that the fittings could be used either for indirect or direct lighting or, alternatively, as a combination of both. Thus, even though the fittings are initially costly, they result in a saving of electrical energy as compared with the indirect system, though all the advantages of the latter are derived.

Recently tubes of fluorescent light have come into common use. They not only emit brilliant, soft, diffused light, but also consume much less electrical energy. They eminently fulfil all the six requirements mentioned above and are thus ideal.

For any of these systems, either pendants, suspended by a flexible wire from the ceiling, wall-brackets, table-lamps, or floor-standards may be used. The latter, in particular, are very convenient, their use dispensing with the difficult problem of settling the positions of lighting points, and if a few plug points are provided, one or more of these lighting standards connected to them by flexible wire could give sufficient light anywhere in the room.

The intensity of a source of light is measured in terms of *candle-power*. The unit commonly employed is the *foot-candle*, which is the illumination received by one square foot of perpendicular surface at a distance of one foot from the source. In the lighting of our homes by electricity, however, we are more concerned with the wattage of the lamp, and this depends upon several factors such as the system of lighting (whether direct, indirect, or semi-indirect), the reflecting material and shape of the reflector, the colour and texture of the ceiling and walls and the size of the room, height of ceiling, and so on. Pure white colour reflects about 84 per cent, and at the other extreme is crimson, which reflects only 6 per cent. In between these is the whole range of light colours. Pale cream, light buff and primrose are good reflectors, then come grey, blue, green and red, which are poor reflectors.

The relation between watt and candle-power depends upon the construction of the lamp, both in respect of the material of the filaments and the gas filled in. Of late years, great improvements have been made in the lamp, and in the best lamp as low as 0.1 to 0.3 watt (amperes \times voltage) is required for giving an illumination of one candle-power with a good reflector. This

shows the importance of using lamps made by reliable firms of long experience, even though they may be initially a little more costly. The so-called "cheap lamps" are assuredly dear in the long run.

The ideal conditions are that a faint twilight of diffused light from invisible source in each room should give general light, and there should be lights of the necessary specific intensity placed at centres, such as for reading, needlework, etc., either in the form of wall-brackets, table-lamps, or floor-standards. Passages and, particularly, staircases should be adequately lighted. The kitchen should have a strong light. The lights in the dining-room should be directly over the table. The general lighting of the bed-room should be of a soft, restful nature and stronger diffused light should be provided in the dressing-room.

A FEW PRACTICAL HINTS ON ECONOMY IN LIGHTING

(1) It pays in the long run to use a costlier wire than spending on decorative fittings. Besides, ornamental fittings are difficult to clean.

(2) It is advisable to use lamps manufactured by a firm of long standing and repute, though they may cost more in the beginning. They will pay their extra cost in two or three months only, by effecting a saving in electrical energy.

(3) Instead of using lamps of high wattage, it is possible to derive the same illumination with lamps of much lower wattage by (a) providing a scientifically designed reflector, (b) adjusting the distance or height of the lamp, (c) fixing them just at places of maximum advantage, and (d) keeping the reflector and the lamp free from dust and smoke.

(4) The shades or reflectors should be cleaned from time to time with soap-water. Dust, if allowed to be deposited on them, absorbs light.

(5) If a switch is found to get warm, it should be immediately replaced by a new one.

(6) The flexible wires should be occasionally examined. If at any place the cover is worn out, exposing the copper wire inside, it should be replaced by a new piece. The flexible wires should be renewed every three or four years; by the action of the atmosphere they deteriorate. They are often the cause of break-out of fire.

CHAPTER XVI

An Ideal Home

SPECIFICATIONS

(1) That it shall provide excellent facilities for cooking, dining, sleeping, rest, entertainment, toileting, children's activities, study, hobbies, concentration, and storage.

(2) That it shall be built to endure—built in such a manner that strength and stability shall be reflected in every part of it.

(3) That it shall shelter and protect the inmates from the elements, and afford them perfect health, ease, comfort, and happiness as a combined result of excellent workmanship, faultless sanitation, delightful orientation, necessary privacy, perfect flexibility, and unobstructed circulation.

(4) That it shall reflect the personality of the family in it, with the individuality of appearance impressed upon it. A home—plain, simple, unobtrusive; yet neat, tidy and sublime, both in appearance and in quality.

(5) That it shall suit the family's purse, and shall be capable of expanding as both the family's demands and income increase.

(6) That it shall be a home where the glory of Love, the joy of Happiness, and the peace of Contentment shall reign forever. A home where little voices shall babble in the joy and innocence of babyhood, and grow to healthy childhood, boisterous and noisy, then gradually to full, blushing youth, and in the process of evolution, come to maturity and grey old age, finally in fullness of time to rest in eternal peace.

(7) That it shall be the delight of children, the rallying-point or centre of the family, that shall attract its many members and hold them together, knitting generations, each to each. A home which shall forever remain the dearest spot on earth, not because of its cost, nor because of the richness of the materials and furnishings, but because of the happiness it has given, the storm and stress it has faced, the tears it has dried and the smiles it has raised.

• • •

Introduction to Plans

IN PRESENTING the plans in the following pages, it is far from my intention that they should supplant the valuable and special services of architects. They are given rather to create an interest in the minds of laymen in the study and analysis of the plans and elevations of houses designed by competent architects, and to enable them to appreciate the difference between good and bad planning. They are given with the further object of illustrating the many comprehensive ideas suggested in the text in the foregoing pages, reference to which is frequently made in the notes on the plans.

They are, however, never meant to serve as "type plans" to be blindly adopted. No type plan, however good, can ever satisfactorily fit the varying conditions, such as, the aspect, location, orientation, etc. A type plan is lifeless; it lacks the personality which every home, with its individual aspirations and sentiments, must necessarily possess. A house must fit the family, as clothes do the wearer. It must also reflect the personality of the family as dress reflects that of the wearer. Type plans are like ready-made clothes, and cannot be accepted without certain amount of compromise and sacrifice.

COSTS

In the previous edition approximate cost of each plan, based on the average cost of labour and materials obtaining in different states were given. But they varied very much not only from state to state, but from town to town of the same state. The average cost calculated, not only led one nowhere, but, on the contrary created some misunderstanding. Therefore, as already suggested in the introduction, the reader is advised to consult a local architect or an experienced contractor, showing him the plan, and giving him rough specifications, or an idea of what sort of materials one intends to use in walls, flooring, doors, windows, roof etc. to ascertain the rate per square ft. of plinth area, which will give him a rough idea of what the building is going to cost.

In these days of sky-rocketed costs very few people can pay all the money required for their homes as ready cash. You must obtain a loan. Loans are obtainable from various sources: From Government directly, through coop. housing societies, from Life Insurance Corpn. of India, banks,

or private individuals. The amount of loan is determined by your income, your age, your ability to repay in future, and the appraised value of your plot and home. It is to be paid off within a period of 10 to 30 years by monthly instalments, which include the share of the principal, interest, taxes and insurance.

As a rough guide,*

(1) The total cost of your home should not exceed three times your annual income.

(2) Your monthly payment should not exceed 25% of your monthly income.

Here are over 85 plans, most of which are specially designed for this edition. Nearly 50% of them have a built-up area of less than 1200 sq. ft., the smallest being of 336 sq. ft. To suit the requirements and tastes of different persons they are divided into (1) small, independent cottages (bungalows and storeyed houses), (2) row buildings, (3) flats, and (4) semi-detached houses. There are also a few plans of large houses to suit persons of the wealthy class.

For some persons who like tiled roofs which make the houses look snug and cosy, a few houses with sloping roofs are given. Still they are all modern in design.

A common complaint with flat roofs is that they often leak and cause great annoyance. The primary precaution is to cover the surface with either tiles, or a slightly rich mixture of concrete. In the latter case the surface should be left slightly rough. If it is polished, hair cracks are likely to be formed. Next, a good surface slope should be provided so that *rain water freely flows away without the least accumulation anywhere*. If hair cracks develop at all, and the roof leaks through them, just before the monsoon, a light wash of cement to fill the hair cracks, followed by another of a weak solution of alum, and a third one of thin solution of soap, should be given in succession by means of a mop, or a broom.

If the notes in this volume are studied, and the suggestions therein carried out, it would be a thrilling experience, culminating in the *Ideal Home of Your Dream*.

* All this and also how much you should build has been discussed in detail in the Author's book "Build Your Own Home" in a very practical manner. Hints are also given on how to keep within the estimate by postponing certain items conveniently to a future date to be done as you save.

PLAN NO. 1
BUILT-UP AREA 336 Sq. Ft.

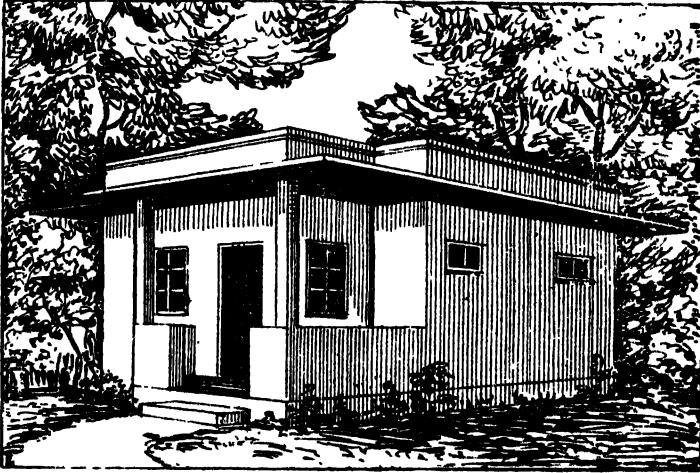


Fig. 40

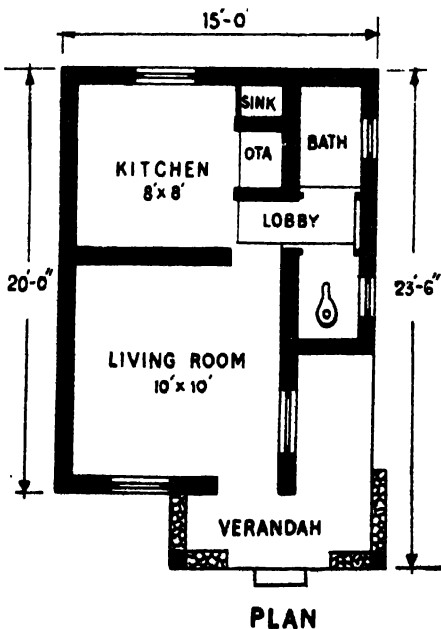


Fig. 41

This is a plan of a low cost house designed and actually built at Delhi at the International Exhibition, Delhi, at a cost of Rs. 3,540 in 1954, by the National Planning Corporation, on foundations in firm soil, 2 ft. wide, filled with 1 : 5 : 10 cement concrete, plinth of brick in cement (1 : 8) 1' high. Walls of cement concrete solid blocks laid to make hollow walls 8" thick. Frames of doors and windows of country teak, Panelled door shutters of teak with black sheet panels. Flooring of stabilised soil-cement. Roofing of burnt clay bricks with reinforcement laid flat with Indian Patent stone on top. Finishing of cement pointing on outside, colour wash on inside, and doors and windows painted. Services: one w. c. with drainage, water-supply, and electric wiring.

PLAN NO. 2

BUILT-UP AREA 351 Sq. Ft.

This is perhaps the smallest and most compact cottage. Still it is far superior to the single room or even two-room tenements having the same area in a large building of the *chawl* type.

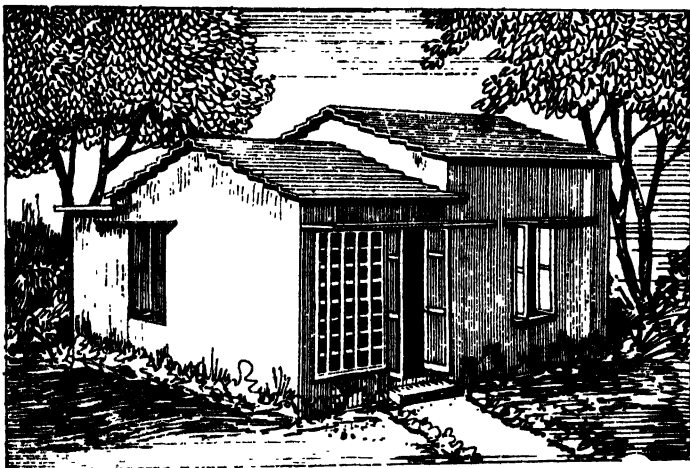


Fig. 42

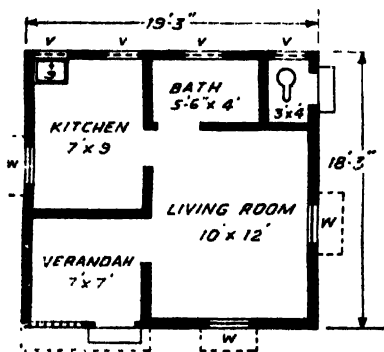


Fig. 43

= precast ventilators; W windows; J = ornamental concrete jali.

Courtesy—Concrete Association of India. Slight alteration is made in the position of the w. c.

It is self-contained in every respect. It was designed and actually built by the Concrete Association of India at Madurai, at a cost of Rs. 1900/- in 1960. The specifications are: Foundations of 1 : 6 : 12 concrete; Walls 8 in. thick of soil-cement blocks; Frames of doors and windows, of R. C. C. and their shutters of $1\frac{1}{2}$ " thick wood with asbestos cement sheet panels; plastering entire exterior, and interior of bath and w. c. with 1 : 4 cement mortar; Roof of precast T-shaped R. C. C. Flooring of 2" base of 1 : 5 : 10 concrete finished with $\frac{1}{2}$ " layer of 1 : 3 cement mortar.

The walls can be of brick 9" thick and roof of asbestos cement sheets at a slight increase in cost.

PLAN NO. 3

Plinth Area 386 Sq. Ft. Designed and built by Bombay Housing at Delhi in 1954 International Exhibition at a cost of Rs. 2450

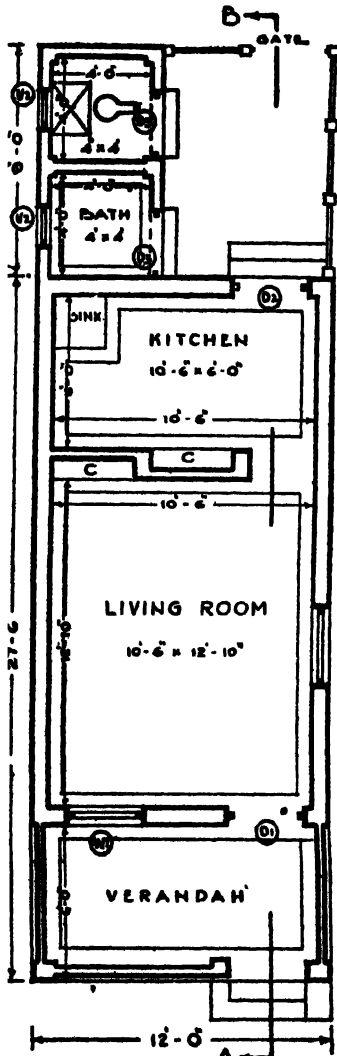


Fig. 45

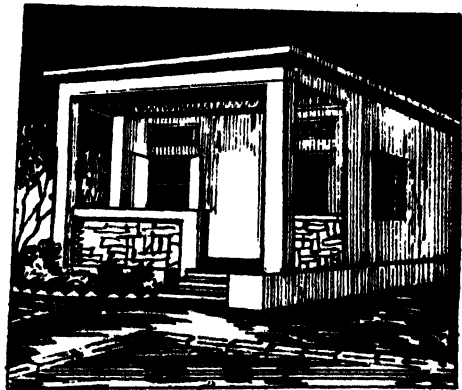


Fig. 44

Foundations: 2 ft. deep filled with 6" concrete; plinth 1' 6" of brick in cement (1 : 6), exposed face cement pointed.

Walls: 9" brick in cement (1 : 6) partitions 4½" thick.

Doors and windows: Teak frames 3" x 4"; shutters one in. thick, false-panelled, windows iron-barred.

Flooring of Indian patent stone on 3" brick-bat concrete.

Roof:—4" thick R. C. sloping slab; Asbestos cement sheet roof on bath and w. c.

Finishing:—Cement pointing on outside. Cement plaster (1 : 5) inside.

Services:—An aqua privy with glazed Indian pan.

The width of the building is only 12 ft.

PLAN NO. 4*

PLINTH AREA 405 Sq. Ft.

This is a plan of a very compact, small, independent cottage. Though small, it provides all the elements of comfort for a small, decent middle-class family. There is absolutely no lobby, or passage, and still there is excellent circulation. Every room is independently accessible. All the rooms are well-lighted, and provided with cross-ventilation. There are certain useful built-in features, such as cupboards in living room, shelves in the kitchen, and a recess for chulla range with a smoke outlet extending over the roof in the kitchen. The bath room and w. c. are conveniently placed, and are independent of each other, so that either can be used separately without disturbing the privacy of the other. There is a tiled front entrance and an exit door on the rear side, which, when closed by night the entire house is shut out from the outside and protected. Slight slopes are given to the flat concrete roof on the top so that rain water easily drains away.

The elevation shown in Fig. 46 is most elegant. The small corner window in the kitchen, round columns in the verandah, and flat roofs at different levels over each room have contributed to the charming appearance of the cottage.

This was actually built by the Concrete Association of India as a demonstration house at Coonoor, with 8" thick walls of hollow concrete blocks, R. C. C. door and window frames, pre-cast T-beam roof, Indian Patent stone floor, $\frac{1}{8}$ " cement plaster on walls, benteak wood panelled $1\frac{1}{4}$ " thick door shutters, glazed windows, etc. at a cost of Rs. 2775/-.

The house can be built with conventional brick in cement mortar, R. C. C. slab roof at a cost not exceeding Rs. 3200/-.

*Courtesy, Concrete Association of India. Slight alteration is made in the position of the w. c.

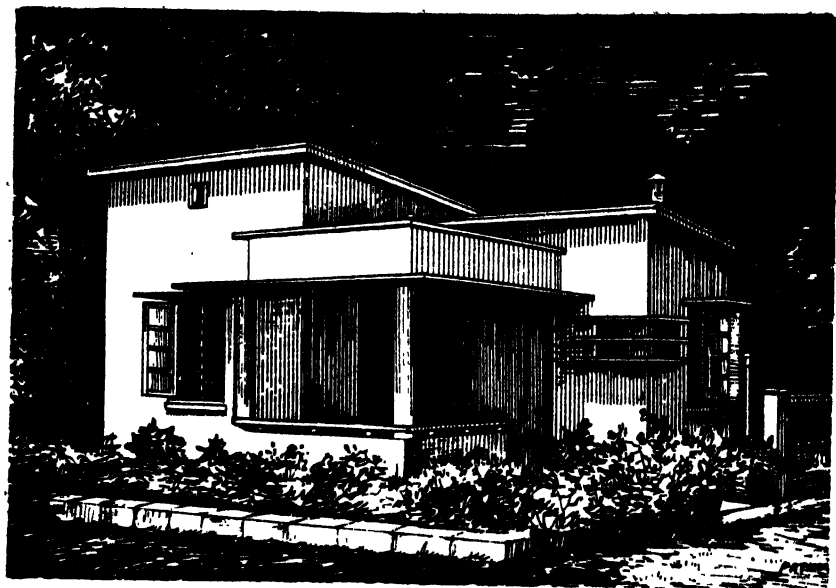


Fig. 46

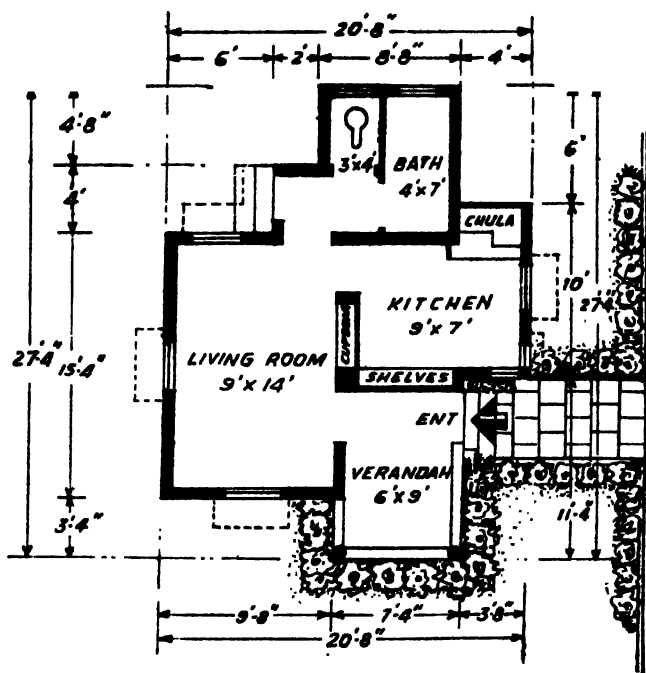


Fig. 47

PLAN NO. 5

BUILT-UP AREA 429 Sq. Ft.

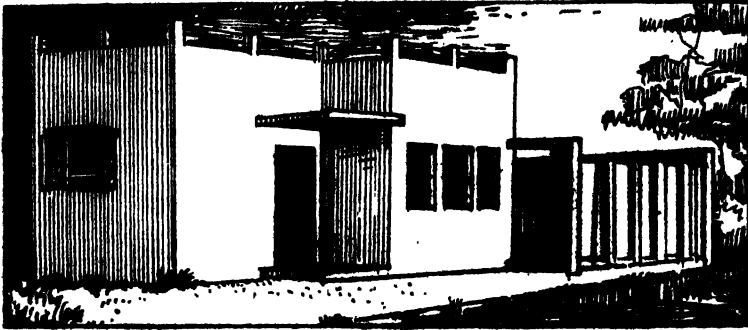


Fig. 48

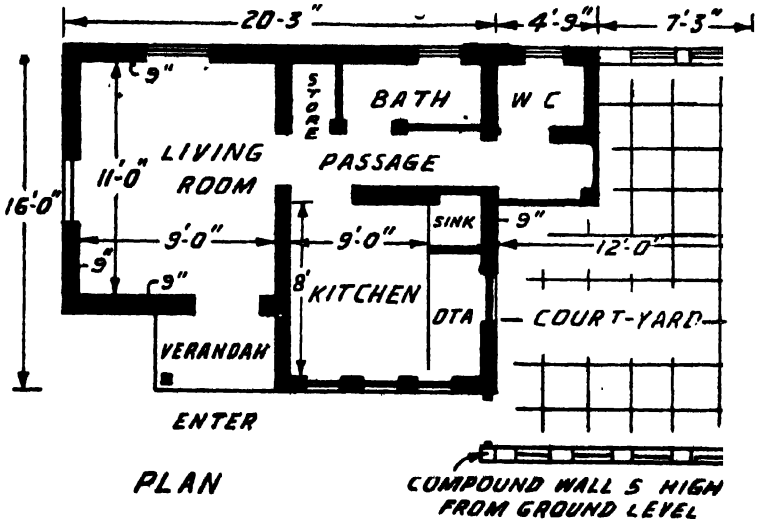


Fig. 49

This is a low cost house actually built for demonstration in Exhibition, at a cost of Rs. 2500/- at Delhi in 1954. The specifications are: Foundation 2' 6" x 2' 6" x 2' 0" deep filled with lime concrete 1'. Plinth 9" thick, 11½' high, 9" above ground. Cavity walls of burnt clay 8" and partitions 4½" in cement mortar. Doors battened, windows glazed, asbestos cement sheet roof. Cement concrete 1" flooring on 3" dry brick ballast and 5" sand. Lime pointing and white-wash inside and outside. Compound wall 4½" between 9" pillars.

Only two room house, but the court yard gives sufficient space in fair weather.

PLAN NO. 6*

Plinth Area 608 Sq. Ft. Designed and Built by U. P. Government at Delhi
at a cost of Rs. 4900 in International Exhibition in 1954.

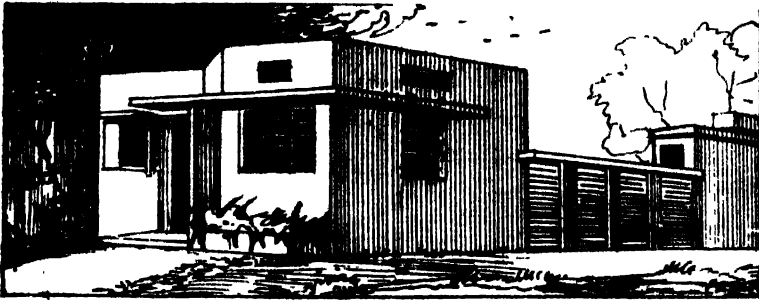
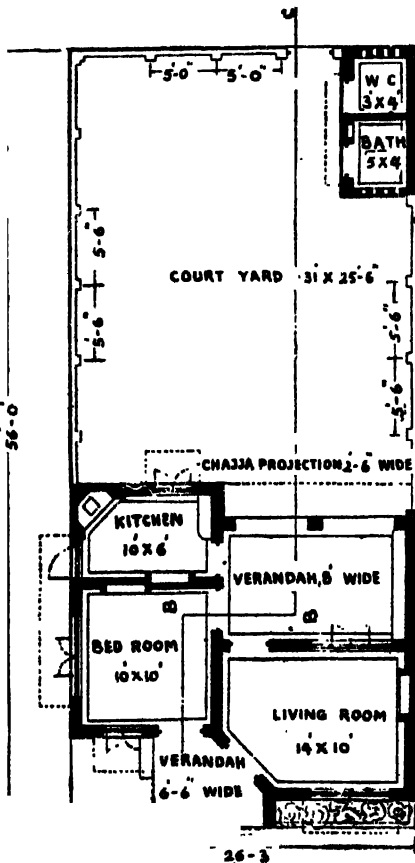


Fig. 50



F-9

GROUND PLAN.

Foundations:—2 ft. deep, 1' 6" wide filled with 9" lime concrete and the rest with brick in cement (1 : 6). Walls 9" thick of bricks in mud, except one course round doors and windows and two courses below roof and verandah pillars, which are in cement mortar.

Doors and Windows:—Frames of country wood 4" x 3" and shutters one in. thick battened and braced, windows glazed.

Roof:—Reinforced brick in cement mortar with $\frac{1}{2}$ " earth and $\frac{1}{2}$ " sand insulation layer, and 3" lime concrete terracing of brick ballast on top.

Flooring:—1" cement concrete on 3" lime concrete.

Finishing:— $\frac{3}{8}$ " cement plaster white-washed, exposed faces snowcem coated, wood work painted.

Services:—Flushed w. c. septic tank and soak-pit.

Fig. 51

PLAN NO. 7*

BUILT-UP AREA 600 Sq. Ft.

Here is a plan of a very compact, comfortable low cost house. It was designed by the Concrete Association of India, but the Author has made slight alterations in the kitchen, living room and added an Indian type w. c. on the rear side to make it more livable. The bath room is very large. It is possible to provide a large wardrobe in the living room, where there is none, by restricting its width in the front 4 ft.

The sizes of all rooms are good. The verandah in the front if enclosed by a low wall, and by a metal or concrete jali, or wooden trellis would be a very useful room—perhaps more useful than even the living room. The bed room of 14' x 9' with two wide windows, and a built-in wall cupboard would be a very pleasant room. The living room, though small, is well proportioned. Provision of a wardrobe by cutting a slice from the bath room as suggested above would increase its utility. The oblong shape instead of square of the kitchen would make it possible to accommodate a dining table and 2 or 3 chairs in front of the lobby. The latter is only six ft. long, but it has given independent access to all the rooms. The provision of an extra w. c. was a necessity. For, when the only commode in the bath room is engaged by one person inconvenience would be caused to every one else.

The exterior with an air of grace and quiet charm is very inviting.

* Courtesy—Concrete Association of India. Slight alteration is made in the kitchen.



Fig. 52

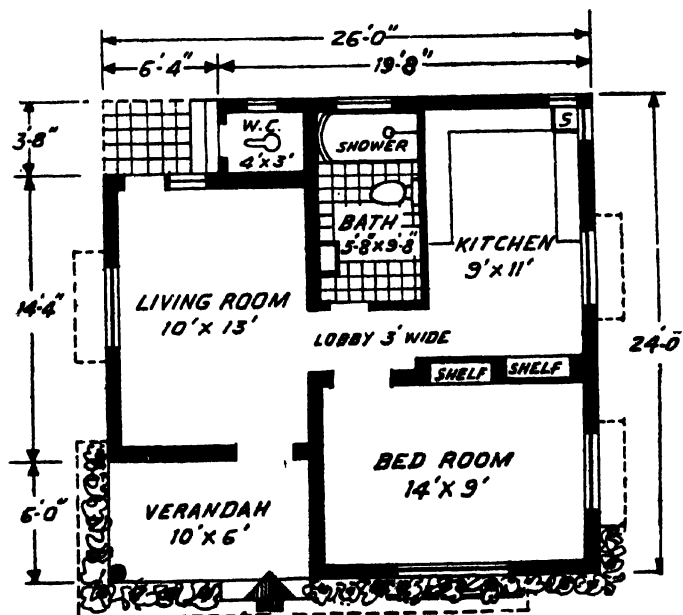


Fig. 53

PLAN NO. 8

Plinth Area 600 Sq. Ft. Designed and Built by Pepsu Govt. at Delhi in 1954 at a cost of Rs. 5225 and at Patiala at Rs. 4302.

The low cost house shown on the next page designed by the Pepsu Government is very convenient. At the entrance is a verandah 12' x 6'. Behind it is a living room of 15' x 10'. It is intended also to serve as a dining room, for which a table and four light chairs are shown next to the entrance to the kitchen. The latter is a small room of 8' x 6' 6". On the right hand side of the kitchen is a bath room of good size, to which two entrances are shown—one from the bed room, and the other from the outside.

All the furniture is shown on the plan. The grouping is very good. Since there is no underground drainage in the area either a w. c. with a septic tank, or a latrine on the conservancy (basket) system away from the house is provided.

The elevation is very beautiful. But some effort at cost of convenience seems to have been made for it. For instance, the length of the verandah is cut short a little. Had its length been equal to that of the living room, it would have provided more space, and the cost would have been the same as one more corner is increased. Similarly a recess is unnecessarily made in the living room.

The courtyard behind the house is a blessing. Excepting the rainy season, it can be used as a part of the living room, an open air sitting room, outdoor dining room, and a secure play area for toddlers under the supervision of the mother from the kitchen.

Thus the small house has got all the comforts of a big house, and is very beautiful to look at.

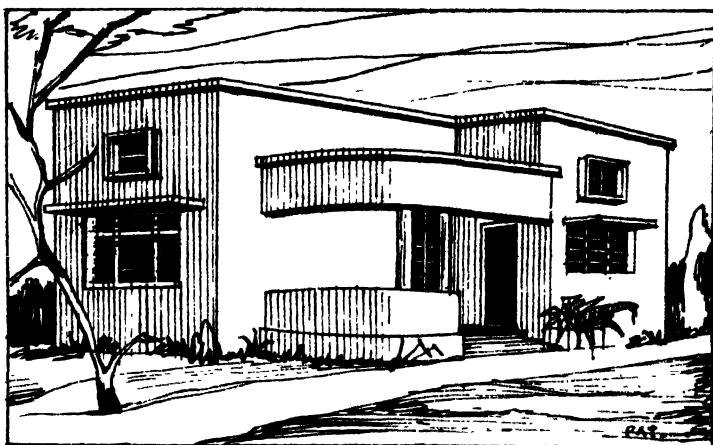


Fig 54

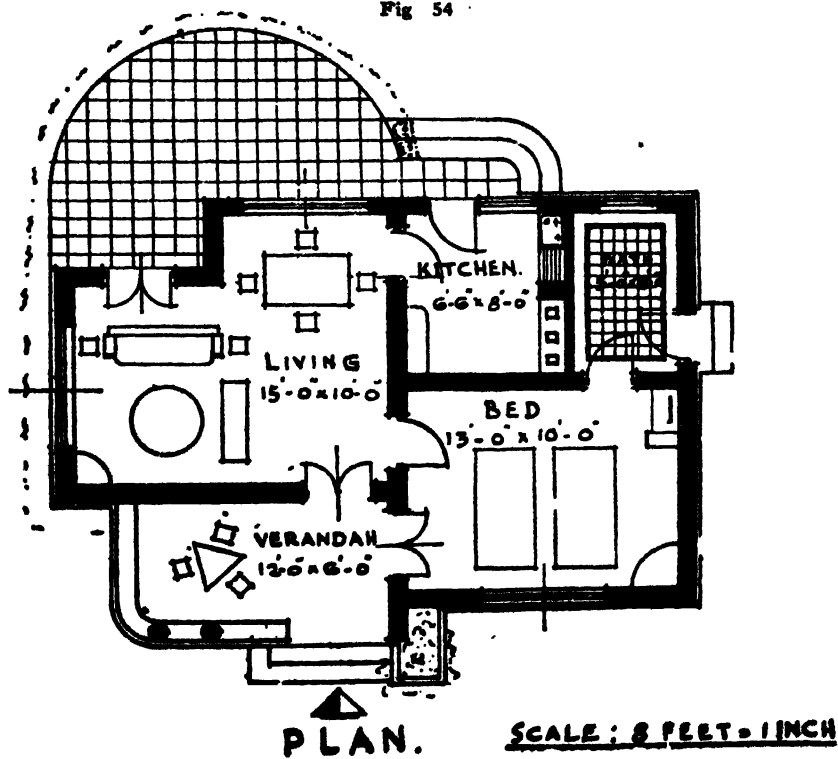


Fig. 55

PLAN NO. 9

BUILT-UP AREA 662 Sq. Ft.

This is a type plan adopted by a Co-op. Housing Society at Poona for rehabilitating people belonging to the lower middle class whose houses were washed away during the disastrous floods two years ago. Government of Maharashtra allotted them building plots each of 2000 sq. ft. (50' x 40'), and advanced loans to erect buildings not exceeding one-third of the plot area.

The architects have very skilfully designed the building to give the maximum accommodation within a minimum area. The kitchen is intentionally placed in the middle, instead of the rear, to allow the house owner to let out the bed room and the verandah to a newly married couple with a view to cover part of monthly instalment payable to the Govt. for the loan, interest and insurance, and many families have actually taken advantage of this. The bath and w. c. are conveniently located to be used by both the families.

There are several special measures adopted to bring down the cost. e.g. the outer walls are 9 in. thick, and inner partitions of $4\frac{1}{2}$ " thick of brick in cement, instead of windows honey-combed brick work is done in verandah, bath and w. c. This admits light and ventilation and costs very little. The entire structure is a frame work of R. C. C. columns and beams. (The dark squares in plan indicate columns). The wall behind the bath and w. c. is $1\frac{1}{2}$ brick thick to support the load of the water tank. The R. C. C. columns, however, are designed to support the load of two more floors, if raised in future. The rear verandah is specially designed of adequate size to accommodate a stair case when the upper floor will be built. The elevation is simple but beautiful.

The following are the specifications: Foundation: of 1 : 4 : 8 mass concrete; walls— of brick in cement (1 : 6); paving— of Shahabad slabs in all rooms; doors of country cut teak, plane planked; windows; glazed of— of R. C. C. $4\frac{1}{2}$ " thick slab with water-proofed surface.

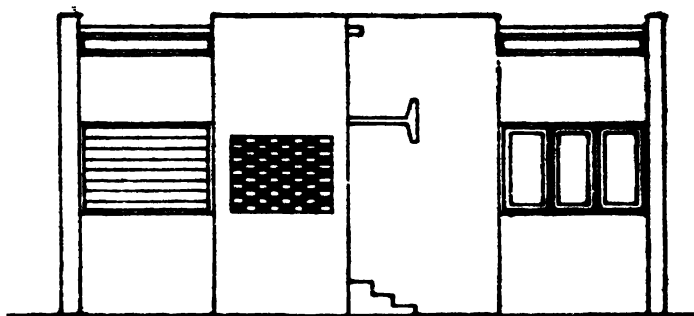


Fig. 56

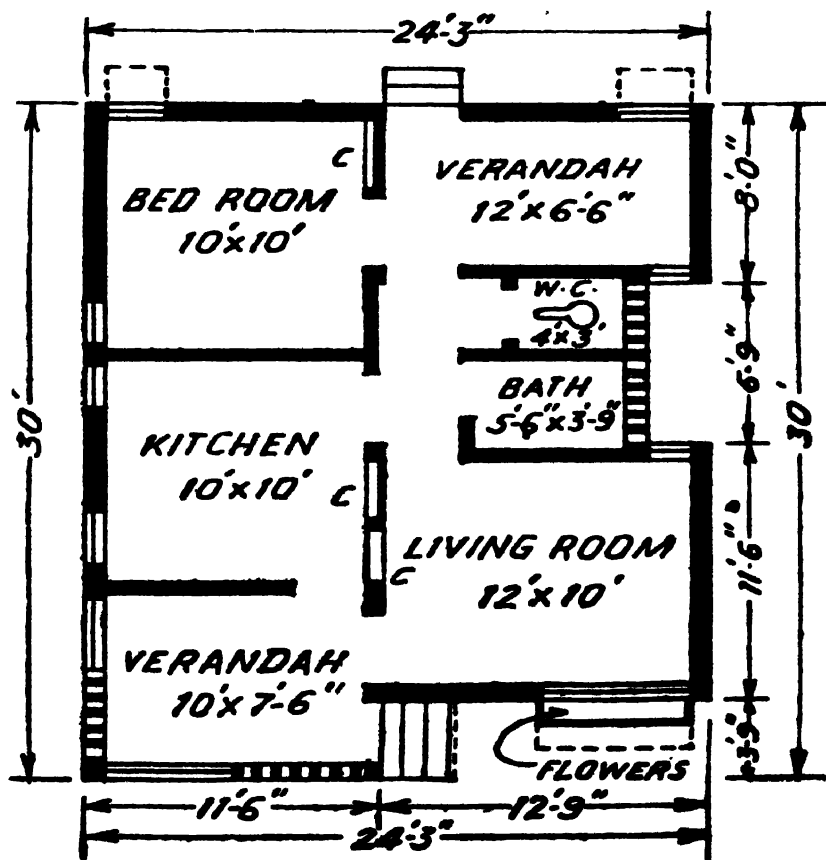


Fig. 57

Architects: Satoor, Katdhare and Gole, Poona.

PLAN NO. 10

PLINTH AREA 620 Sq. Ft.

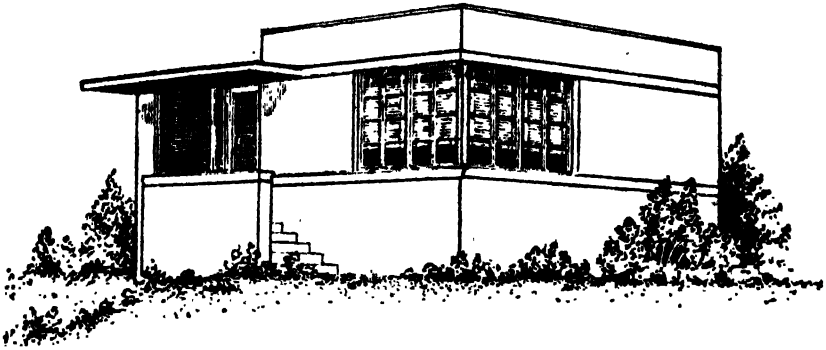


Fig. 58

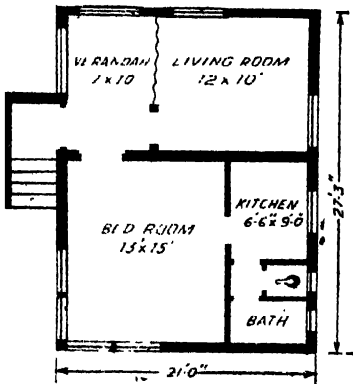


Fig. 59

This is a plan of a small house suitable for a newly married couple. There is a 7 ft. verandah at the entrance, partially closed, so that it can be used as a room. Behind it is the living room, which is small, but on special occasions it can be expanded by removing the curtain which separates it from the verandah. The bed room is large, but as there is no separate space for dining, and the kitchen is small, part of it must be used for dining. The bath and w. c. are separate, but the access to them is through the kitchen, which is a disadvantage. This inconvenience can be partly re-

moved by providing a spring, or swinging door in the kitchen.

The elevation is modern and attractive.

PLAN NO. 11

BUILT-UP AREA 668 Sq. Ft.



Fig. 60

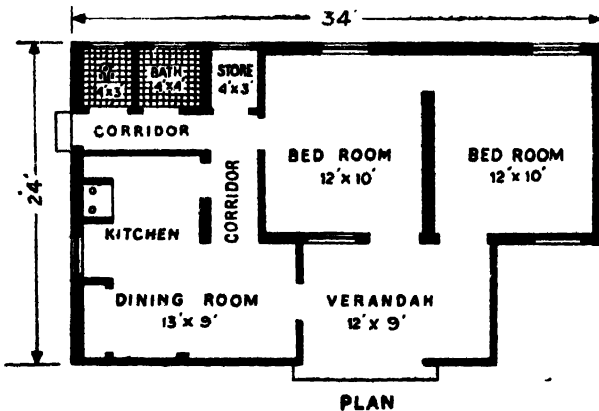


Fig. 61

Built of hollow cement concrete blocks 8" thick in cement mortar, with 3 top courses below ceiling of solid block, cement wash on the outside, and white wash on the inside, 1" cement flooring on 3" lime concrete, asbestos cement sheet roofing, the building cost Rs. 4835/- in 1954 in Delhi.

The 9" verandah is virtually a living room. Two bed rooms of good size and the L-shaped kitchen-cum-dining room and the small store, and bath, w. c. served by a lobby are all very well grouped. A very compact and convenient cottage indeed.

PLAN NO. 12

PLINTH AREA 702 Sq. Ft.



This is a low cost house suitable for a small narrow plot. It covers a built-up area of 700 sq. ft. only, and yet provides all the accommodation normally required for a small middle class family. It is most economically designed without wasting a single inch of space under the roof. It faces North. The living room is of ample size considering the smallness of the house. The bed room of 14' x 11' with three windows both in the South and West and an ample clothes closet 4 ft. wide would be a luxury. The modern kitchen with raised chulla and sink on a waist-high platform, and cabinets on both sides would prove a joy of the housewife. As there is only one bed room the dining room will serve as a multi-purpose room. The bath room and w. c. are ideally situated with respect to other rooms, and are separated by a small lobby. A loft on their top and passage reached by a ladder would afford ample storage space.

The specifications include 11½ brick outer load-bearing walls in cement mortar, two 6" x 6" R. C. C. hidden columns in partitions supporting R. C. C. beams below concrete slab, country cut, sal or benteak wooden shutters hinged to R. C. C. frames. Asbestos cement sheet roof with 2" dry grass thatch on top for mitigating heat.

The exterior is pleasant, soothing and inspiring, the rubble wall on the face of the dining room and the thatch covered roof lend snugness and domesticity to the house. The cost will range between Rs. 6500 and 10,000, exclusive of site according to the locality.



Fig. 62

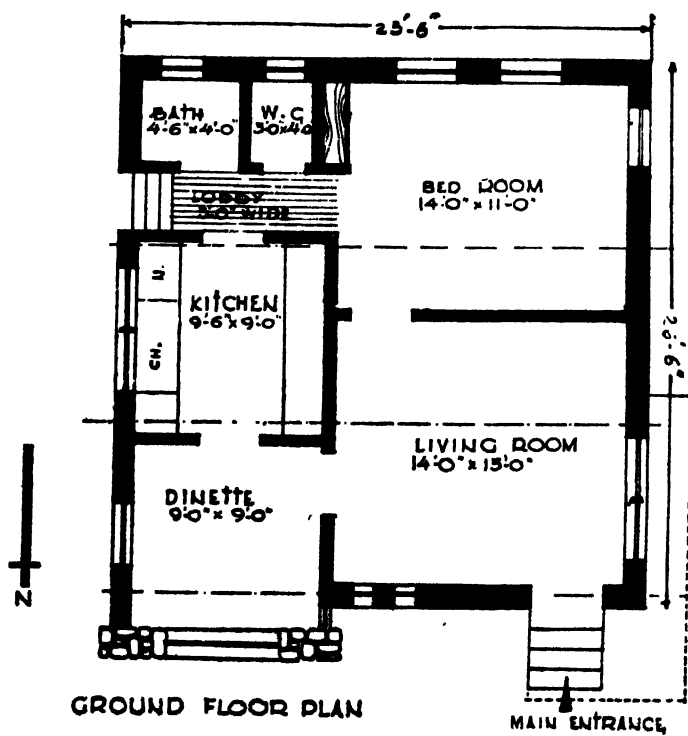


Fig. 63

PLAN NO. 13
PLINTH AREA 700 Sq. Ft.

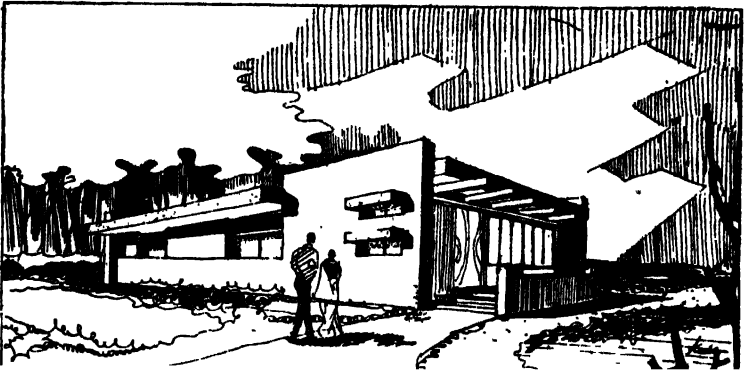
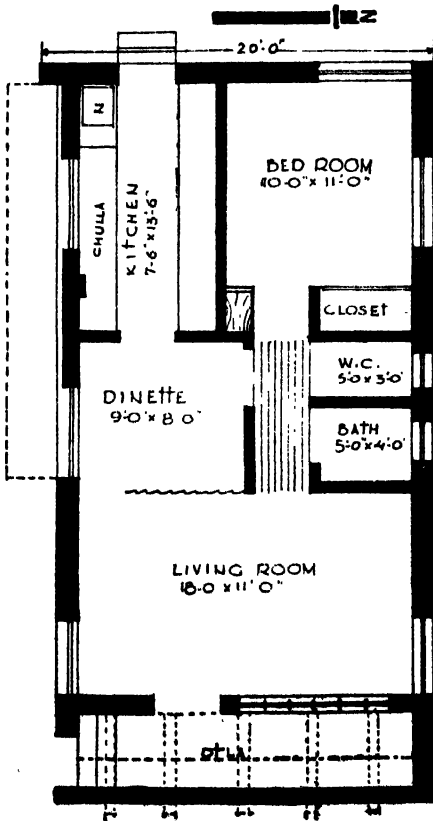


Fig. 64



The width of this house is hardly 20 ft. The plinth area is 700 sq. ft. only, and yet it gives a bed room, a dining room and good-sized kitchen and living room. The 8-ft. long lobby gives independent access to all the rooms and to the sanitary block. The kitchen has two parallel rows of cabinets with a passage running between, which ends in a back exit. There are two closets in the bed room.

The modern elevation is unconventional. It would cost between Rs. 6500/- to 8000/- according to the place.

The spacious living room on the N. E. will remain cool and the bed room on the West will have plenty of breeze. The dinette is very conveniently placed between kitchen and living room separated by a curtain.

Fig. 65

PLAN NO. 14

BUILT-UP AREA 744 Sq. Ft.

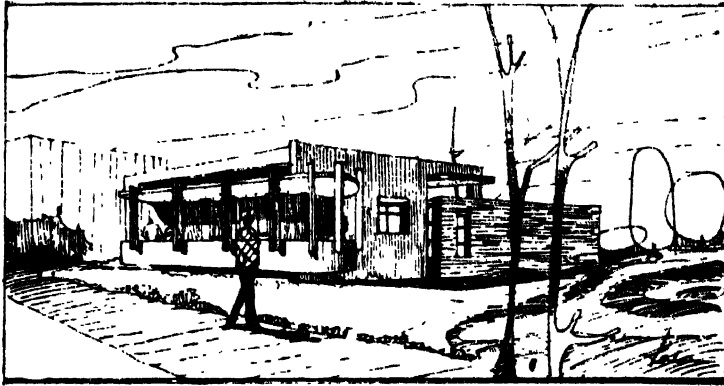
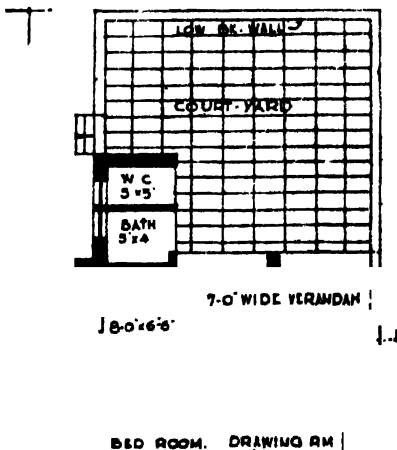


Fig. 66



This plan represents a small, compact cottage actually built for demonstration by the U. P. Govt. at International Low Cost Exhibition at Delhi at a cost of Rs. 5100/- in 1954, on foundations 1' x 1' 6" wide filled with concrete of broken brick 12, sand 6, cement 1, and lime one. Walls of brick in mud except in jambs of doors and windows, and top one ft. of walls where cement mortar (1 : 6) is used. 1/2" cement plaster white washed. Flooring of 1" cement concrete on 3" brick-bat lime concrete. Doors and window frames of sal and 1 1/2" shutters. Windows iron-barred and glazed. Six electric points, 2 fans, 4 water taps, flushed w. c., and septic tank.

The paved yard enclosed by a high compound wall is indeed a luxury. The rear and front verandahs serve many purposes.

PLAN NO. 15

PLINTH AREA 810 Sq. Ft.

The plan and elevation on page 143 represent a very picturesque modern house suitable for a moderately large family in suburban area. It is designed for a plot with very narrow frontage. It is one of the most economical plans, so that within an area of about 800 sq. ft. four good-sized rooms, with independent bath room and a w. c. are provided. The small central lobby, hardly eight ft. long, gives free access to every room, and to the sanitary services. There is ample light and through ventilation in every room. The orientation is as good as can be desired. The two bed rooms enjoy free south-western breeze. The larger of the two bed rooms has an ample clothes closet. There is besides a cupboard for storing family linen, with an access from the lobby. There is a rear entrance in the kitchen for the purpose of buying vegetables etc. from hawkers.

The specifications are: Outer walls $1\frac{1}{2}$ brick thick, except the one on the right hand front corner, which is of rubble in cement mortar neatly pointed with cement. All the inner ones 6 in. thick partitions with hidden R. C. C. columns for supporting roof load at the proper places, cement concrete flooring in all the rooms. Flat R. C. C. slab roof with slopes on both sides, lime plaster to walls.

The building faces East. The cost should work out to Rs. 7,500/- to 10,000/- according to the locality, exclusive of the cost of the land.

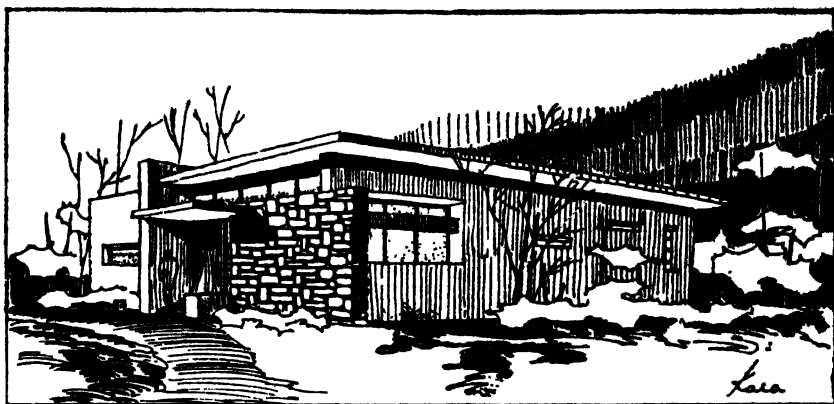


Fig. 68

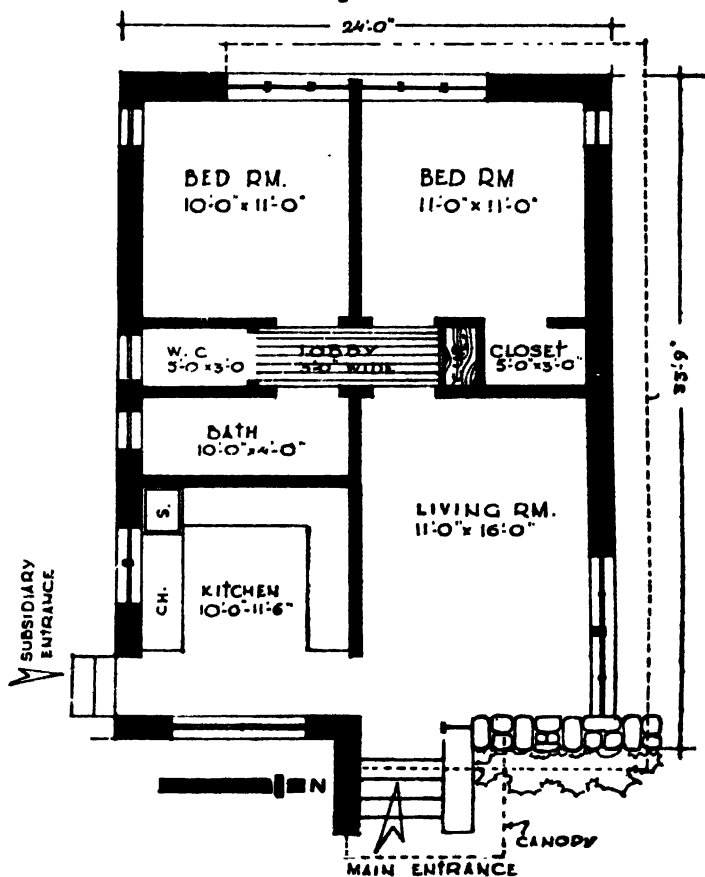


Fig. 69

PLAN NO. 16

BUILT-UP AREA 830 Sq. Ft.

A small house limited in cost can enjoy many advantages of a large, and more costly house. By skilful planning it is possible to produce a compact, convenient, comfortable and easy-to-run house of good appearance like the one on the opposite page.

In this small house the space has been well utilised to include a living room, two bed rooms, kitchen, bath room and a w. c. The chulla in the kitchen is on a raised platform 2' 4" above the floor, and alongside it is a sink with a draining board fixed on its top. Both the latter are kept just in front of the window so that the cleaning operations, whether of dishes or vegetables should be done in full light.

The living room is 16' x 11'—a good size for the type of the building. The semi-circular large window in the front lends charm to the room. There is no separate dining room. However, 2 or 3 seats can be arranged for normal meals in the corner near the door. For formal dinner part of the living room must be used.

The bed rooms are small, but in a small house like this two small bed rooms are preferable to one large. The width of the passage is kept 5 ft. which can be reduced to 3 ft. to make the bed rooms 10' x 14' each.

The overall width of the house is only 28 ft. so that the building would easily fit into a small plot which is another advantage from the point of view of low cost, in these days of high land prices.

The stepped appearance of the elevation helps to create an illusion that the building is large.

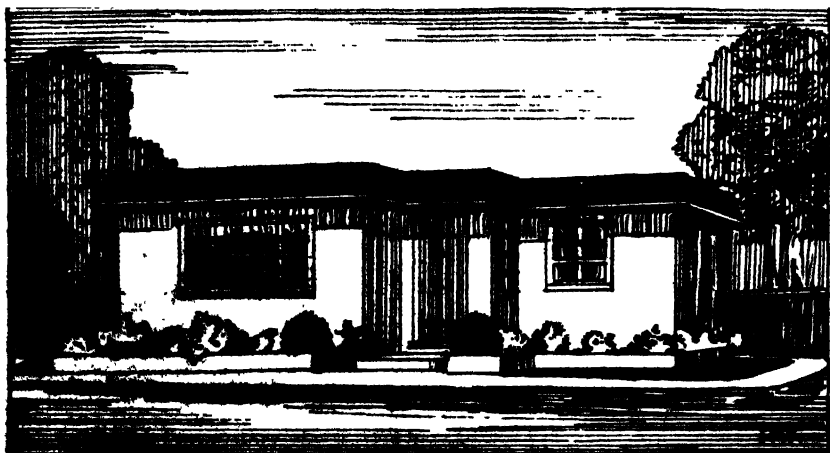


Fig. 70

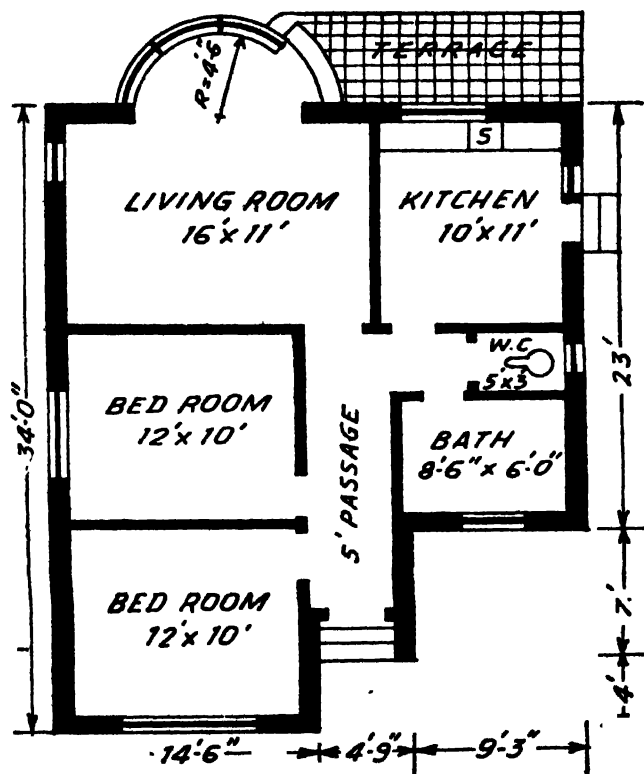


Fig. 71

PLAN NO. 17

Plinth Area: 842 sq. ft.; Floor Area: 555 sq. ft.; Cost at Delhi: Rs. 4630;
Cost in Madhya Pradesh; Rs. 5000.

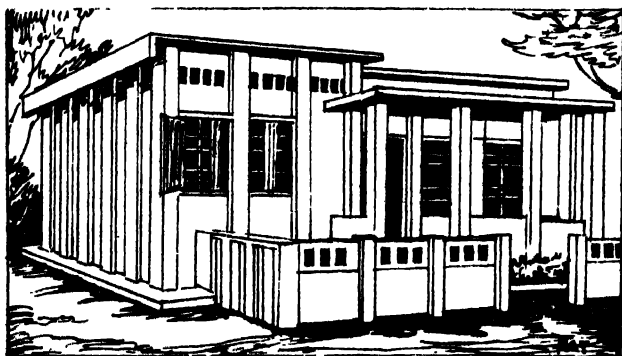


Fig. 72

Specifications

Foundation and Plinth:—Compacted boulder filling to a depth of 2' 6"; topped with 6 in. thick cement concrete (1 : 5 : 8) upto ground, and 2 ft. wide. This is made up of 6 in. thick 2 ft. by 2 ft. base blocks of cement concrete (1 : 3 : 6), with core filled with cement concrete (1 : 5 : 8.) On top of this is laid a 3 in. plinth course of 1 : 3 : 6 cement concrete.

Superstructure:—Pillar and panel construction, Pillars are of R. C. C. 1 : 2 : 4 mix, 8 in. \times 8 in. section with two grooves to hold panels. The reinforcement is of split bamboo lattice as stirrups. The panels are also of R. C. C. 1 : 2 : 4 mix, 1½ in. thick, with split bamboo ¾ in. \times 3/5 in. at 4 in. both ways, tied with binding wire. The gap between the two panels is filled with earth.

Doors and Windows:—Cement concrete *Chowkats* along with pre-cast R. C. C. pillars. Lugged and battened shutters for doors and windows. Concrete *jali* for ventilators.

Flooring:—3 in. thick lime concrete laid over rammed murum, and top finished with ½ in. thick cement plaster.

Roofing:—Asbestos cement sheet roof over teak scantlings 3 in. by 4 in. The top of asbestos sheets is treated with 1½ in. thick mixture of road tar (1 sand : ½ saw dust) for insulation against heat.

Finishing:—Silicate paint coat to woodwork. Internal walls white-washed, and external walls colour-washed.

Services:—Indian type w. c. with flushing tank, taps in kitchen and bath room, and electric lighting.

These houses are built by the Government of Madhya Pradesh and have been very popular.

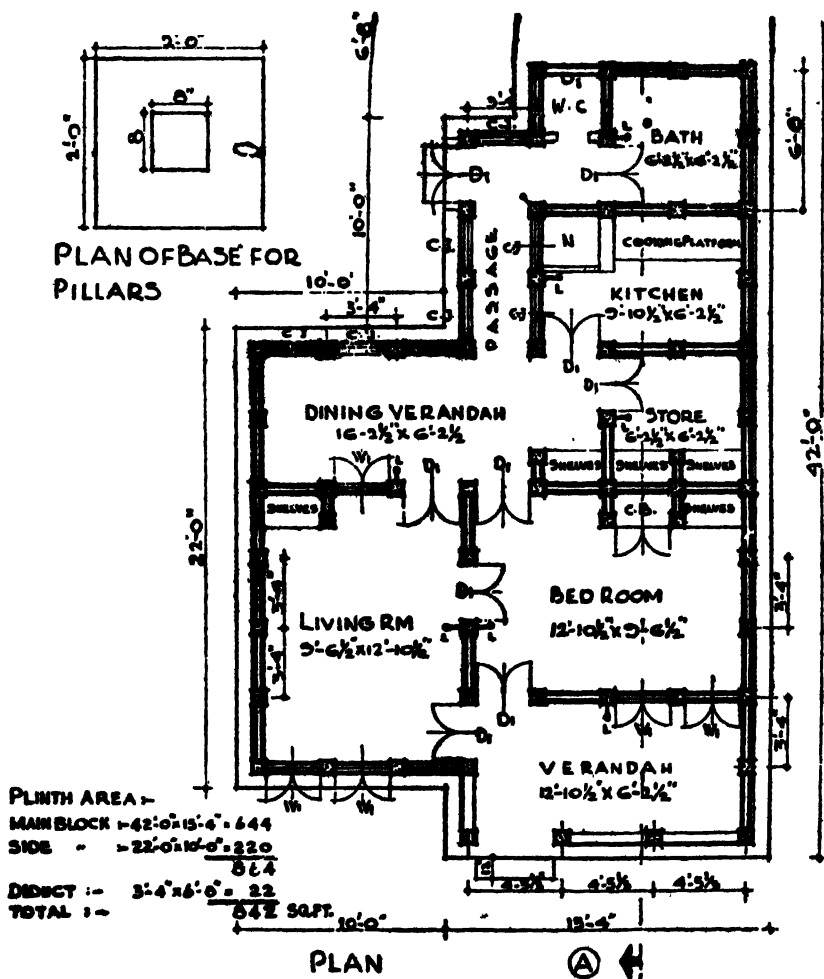


Fig. 73

PLAN NO. 18

PLINTH AREA 856 Sq. Ft.

This is a very small, compact house with a surprisingly large accommodation within a built-area of 856 sq. ft. The reason is that every square inch of space is most usefully utilised. There is hardly a passage of 8 ft. length, yet it provides independent access to every room.

At the entrance there is a verandah 6 ft. wide. Had it been a foot wider it would have served all its purposes better. The living room of 14' x 10' is spacious enough considering the small size of the cottage. There are two bed rooms each of 12' x 10' with very good cross ventilation. The kitchen of 11' x 10' is also adequate in size. It has two windows in two corners which will distribute light equitably all over the area. Besides there is a small alcove for a dining table with two light chairs.

The positions of beds and other furniture are indicated on the plan. The house would be suitable for a plot facing North.

The elevation is quite simple, and straightforward, and yet attractive, with rubble facing in part of the front wall in contrast with smooth plaster on brick surface in the rest. The grill work with straight bars, joined by simple curved pieces to enclose the front of the verandah, the inviting overhanging R. C. C. canopy at the entrance, etc., are some of the features which have enhanced the beauty of the elevation.

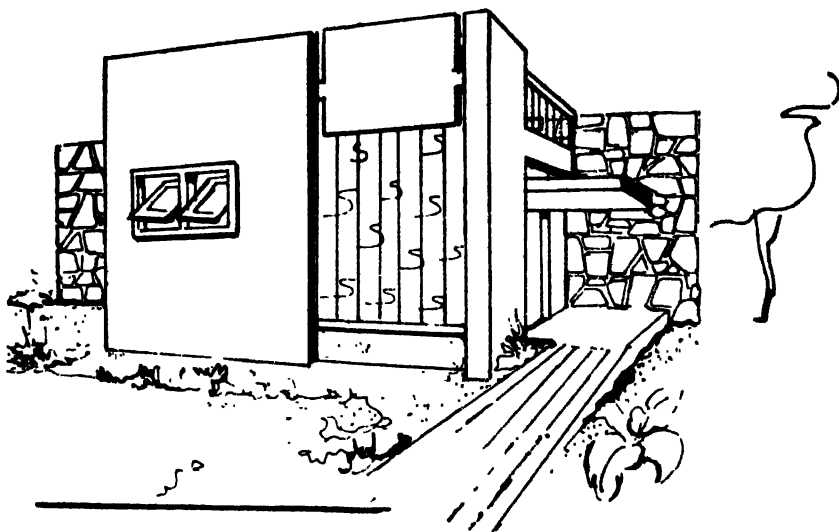


Fig. 74

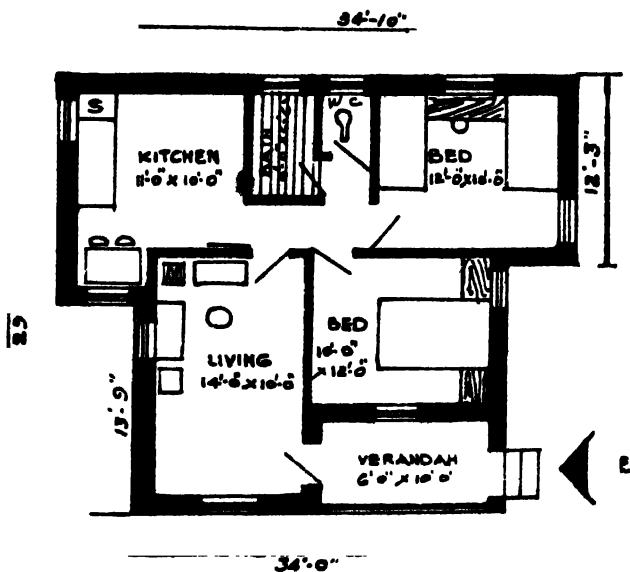


Fig. 75

Architect: Mr. R. S. Bodhani, Poona.

PLAN NO. 19*

PLINTH AREA 883 Sq. Ft.

This is another very compact, economical plan of a house, designed for health and comfort for a medium sized middle class family seeking a home in suburban area. In this small area of 880 sq. ft. four good sized rooms besides a kitchen and an enclosed verandah, which would be more useful even than the living room are provided. The verandah would be useful as a study room for children, a guest room, a sitting room, and a waiting room for visitors. Two spacious wardrobes, one opening in each room in opposite directions are provided in the partition between the rooms. The good sized dining room is conveniently grouped with the kitchen. Like the front verandah it also will prove a multi-purpose room for the inmates, for sewing, knitting, girls' music, etc. The cupboard with shelves in the kitchen, and a loft on top of the bath room and w. c. would provide sufficient space for storage. The smoke outlet and the *chulla* in a recess are extra conveniences. The circulation is as good as can be desired. This is due to the very short convenient lobby. Facilities for light and cross ventilation in every room are excellent.

The house would be suitable for a plot facing South or S. W. so that every room gets the best orientation. The width of the building is less than 29 ft. All the long walls are thick to bear the load of the roof.

The exterior has charms, which are in keeping with the efficient arrangements inside.

* Courtesy: The Concrete Association of India.

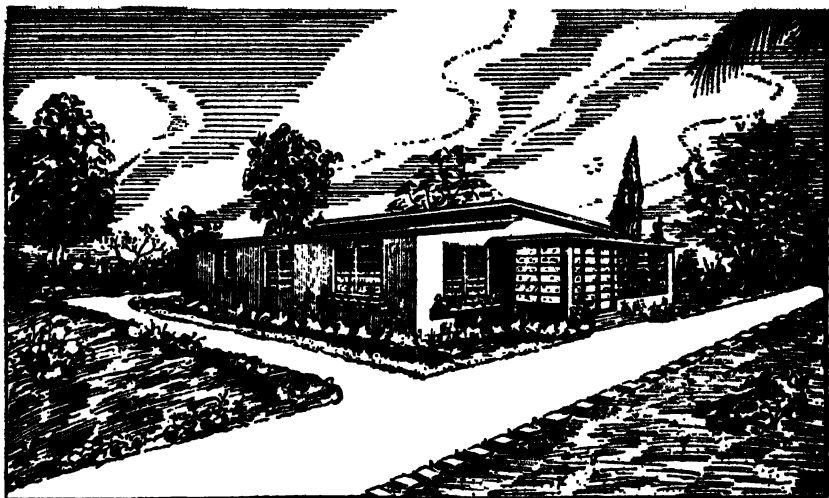


Fig. 76

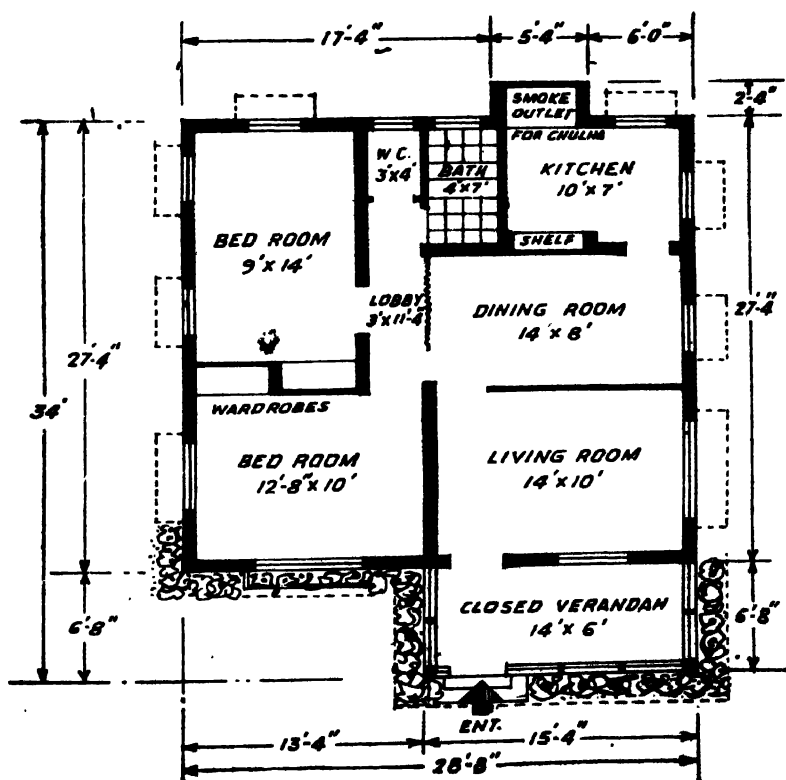


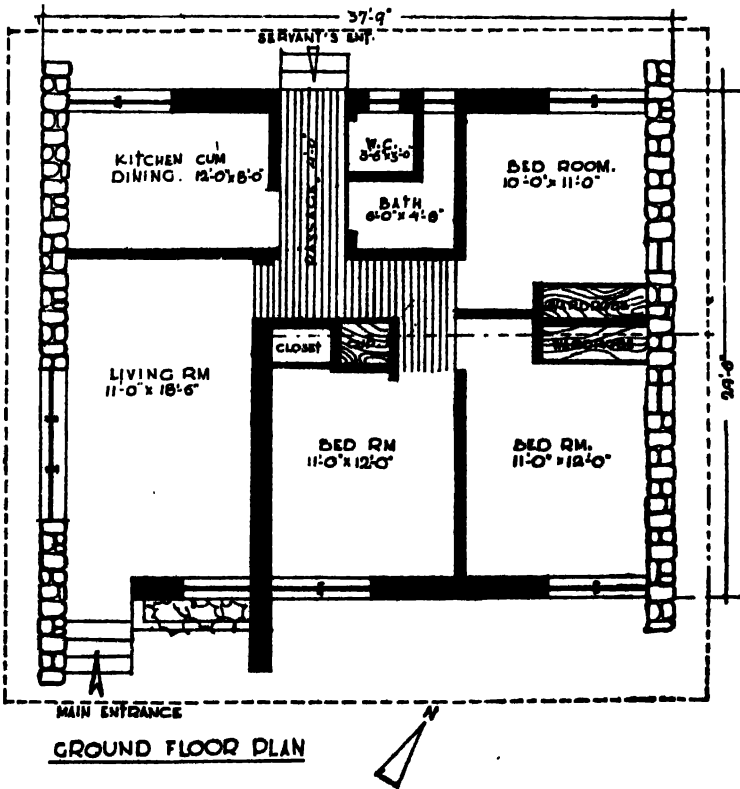
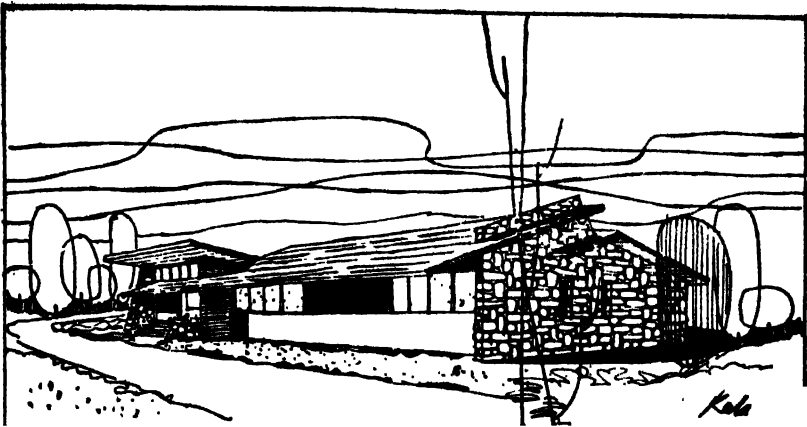
Fig. 77

PLAN NO. 20

PLINTH AREA 915 Sq. Ft.

Here is an extremely snug-looking, quiet, single storey cottage, suitable for moderately large family of average means. It is very skilfully designed, so that within an area of a little over nine hundred sq. ft. three bed rooms, a large living room and a kitchen are provided, in addition to a bath and w. c. The small lobby in the centre not only provides independent access to all the appurtenances including the sanitary services but also affords a rear entrance for servants. The kitchen of 12' x 8' should normally provide two or three seats for early meals of children of school-going age, and for formal regular dining there is ample space in the living room next to the kitchen wall. The bath room is L-shaped and slightly narrow, but if the walls, which do not bear any load are built of brick on edge 4" thick including plaster instead of 6", the space could be sufficiently widened. All the bed rooms are provided with ample wardrobe space. Besides there is cupboard for general family linen, opening in the lobby. It is possible to build a spacious loft not only on the top of the bath and w. c. but also on that of the lobby for storage, accessible from the lobby by a loft ladder. The building faces South-west, so that all the three bed rooms will be flushed with cool breeze by night. The building is rectangular in plan, with no extra corners or recesses, and would fit into a plot with a frontage of 50 ft. or even less according to the particular municipal by-laws. The main walls are thick to bear the load of the roof, and the inner partitions are 6" thick, there being hidden R. C. C. columns in them to support the roof load.

For architectural effect the side walls are made of rubble with joints neatly pointed, i.e., left unplastered. The roof is of flat concrete slab in part and sloping in remaining part.



Figs. 78 & 79.

PLAN NO. 21

BUILT-UP AREA 970 Sq. Ft.

This is a plan adopted by another Co-operative Housing Society for rehabilitating its members who were rendered homeless by the Poona floods of 1961. It consists of a small verandah in front, two bed rooms, a living room and sanitary services, i.e., all the necessary accommodation required by medium-sized middle class family. The sizes of rooms are good. All the walls are thick to bear the load of the roof. This has made it possible to provide one cupboard in every room. It is possible to make such cupboards a minimum of 11" deep by making the back wall of brick on edge 4" thick including plaster on both sides. If still deeper cupboard is required expanded metal sheet should be nailed on the back side of wall and plastered on both sides. This makes a $1\frac{1}{2}$ " thick wall making the cupboard $13\frac{1}{2}$ " deep. There is no separate space for dining, but the kitchen is large enough to provide 2 or 3 seats for it. Had it been oblong, say 15' x 9', or 16' x 8' it would have provided more space within the same area. The rear bed room is not so easily accessible except through the living room. Similarly the bath and w. c. are not easily accessible from the front verandah without disturbing people sitting in the verandah and living room. The small alcove between kitchen and bath room for Pooja room is a special feature. However, there is neither light nor ventilation provided in it. A small concrete ornamental Jali, or at least a little brick honeycomb work would have been suitable without much expense. There is no provision made for future expansion, upwards.

The elevation is quite simple. The random rubble facing is for bringing out an architectural effect.

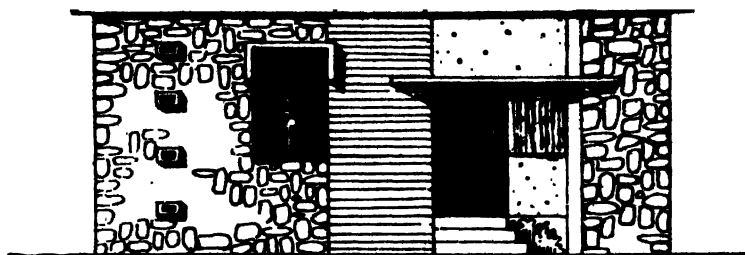


Fig. 80

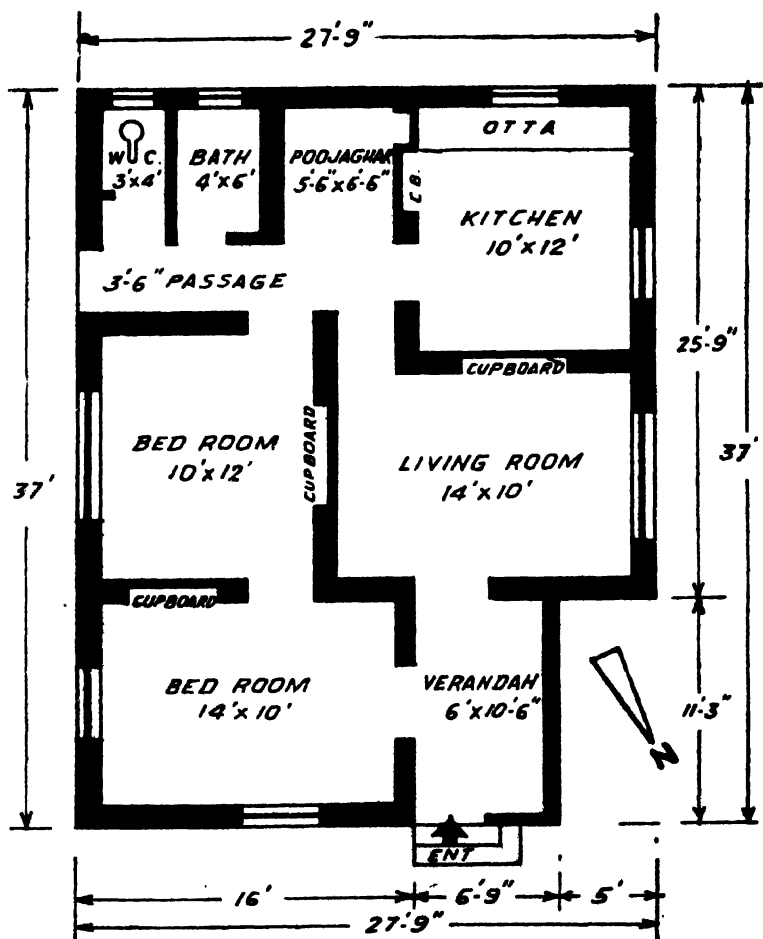


Fig. 81

Architect: G. L. Khandekar, Poona.

PLAN NO. 22

BUILT-UP AREA 982 Sq. Ft.

Simplicity, straightforwardness in outline, and economical use of space are the key-notes of the house pictured on the opposite page. Its rectangular plan is based on sound common sense, and provides all the elements of comfort and amenities, which a medium sized decent middle class family needs.

The 7-ft. verandah at the entrance is both practical and æsthetic. The living room is admirably proportioned, and gives a sense of space as it is linked with the dinette by a simple screen. The stream-lined kitchen is labour-saving. If the partition which separates it from the passage for exit outside is removed and the kitchen is extended upto the bath room, its size would be increased to 16' 6" x 9' 6" and will be ideal to make it serviceable as a kitchen-cum-dining room. In that case the present dinette might be useful as a study or occasional bed room, with a hard board partition instead of a curtain. The positions of the English type bath room and the Indian type w. c. adjoining it are very good. Both the bed rooms are on one side with the hollow partition between them both providing a closet opening into each, and making the rooms sound-proof from each other.

Every room is provided with cross ventilation, and there is excellent freedom of movement assured by the small passage.

The exterior, though simple, has quiet dignity and synchronises with the amenities provided inside.

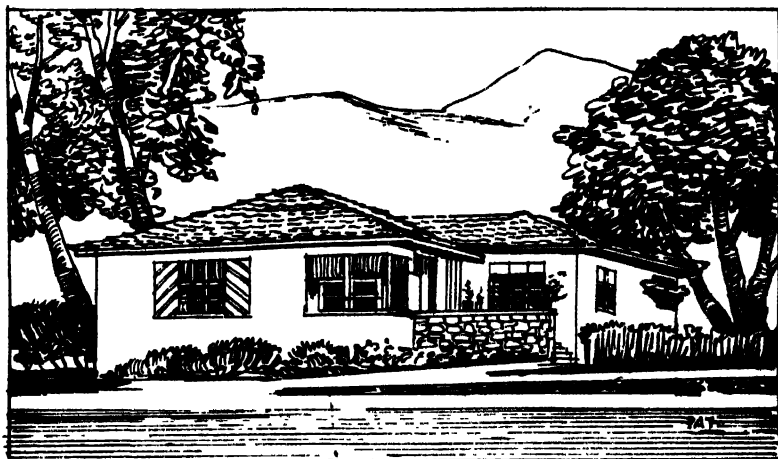


Fig. 82

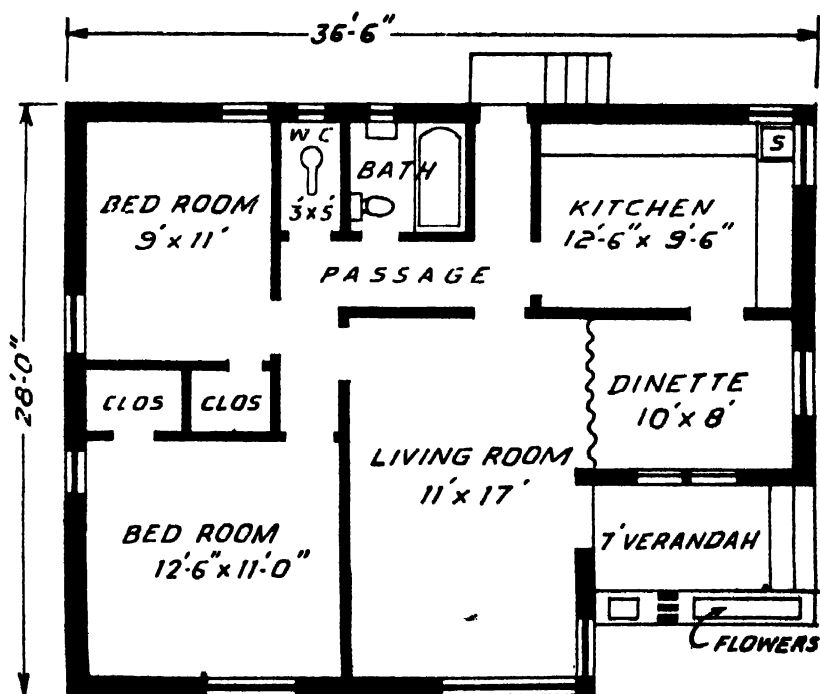


Fig. 83

PLAN NO. 23

BUILT-UP AREA 1000 Sq. Ft.

The House of Nine Parallel Walls

Designed by Mr. V. B. Parab, Architect, for an artist, on a wedge-shaped plot with a narrow frontage, in Kalanagar, Bandra, a suburb of Bombay, this house possesses several unusual, novel features.

In the first place, all the nine parallel walls run in the direction of North-South, and there are no cross walls except the outer front and back walls. The two cross partitions forming one side of the bed rooms, are short, thin, and low, and yet the necessary privacy has been preserved.

Secondly, contrary to the common architectural practice, the outer wall on the East, and that even on the West are built blind, i.e., there are no openings in them, either for doors or windows. This is purposely done for two reasons: (i) to keep out the east-west sun, hot breeze, and piercing rain, and (ii) to secure privacy from the adjacent houses on either side. This was necessary, since the plots being narrow, the distance between the houses is small. In spite of this, however, when I visited the house by 11-30 in the morning in summer I found plenty of cool breeze running through the entire house. The reason is that the door and window openings in the North and South walls are tall and narrow, and are placed well inside between the overlapping parallel walls, and therefore, the wind either from the S. W. or N. E. direction striking against the walls is diverted towards the narrow openings in the parallel walls, and is guided inwards by the latter for free circulation inside. Incidentally as the openings are placed well inside they are protected by the side walls, doing away with the necessity of common projecting canopies.

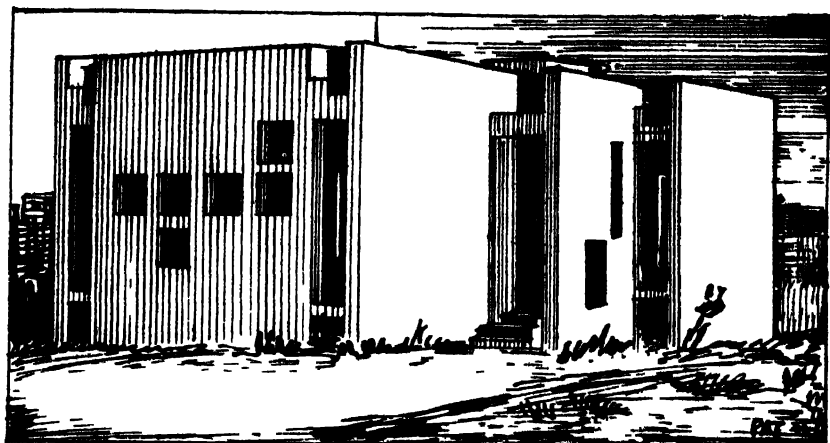


Fig 84—Front elevation

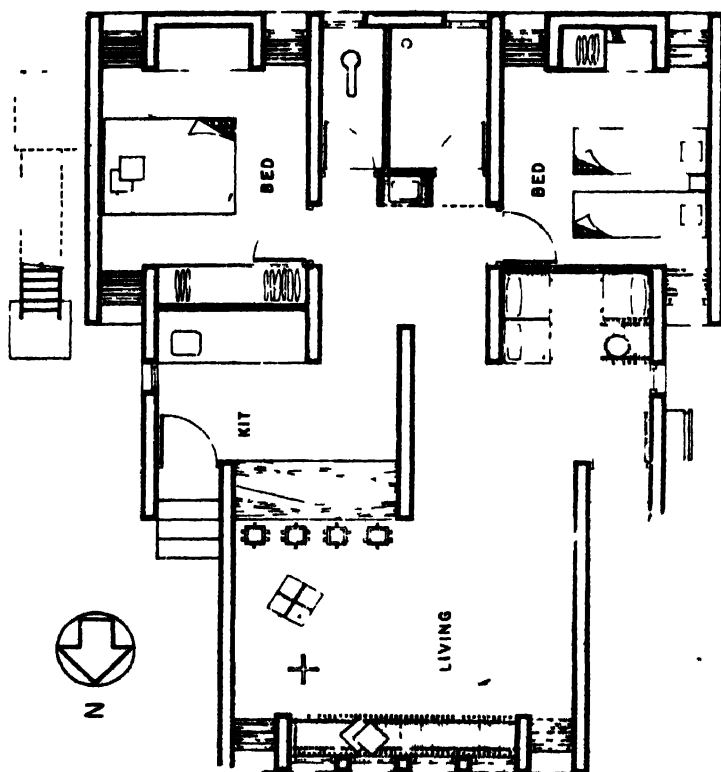


Fig 85—Plan

Architect: V. B. Parab, Bombay.

Third feature is that though the roof is of R. C. C. slab there are no beams. The roof is supported on the N. S. parallel walls. The span between them, except in the living room being small, no beams are required. In the case of the roof on top of the living room, the slab is strengthened by thickening the middle portion than elsewhere.

Fourthly, the few short, cross partition walls do not reach the ceiling, which causes the entire ceiling to be exposed to view, creating an illusion that the house is rectangular of the full width as at the back (not tapering in front as it actually is), and consists of one spacious room.

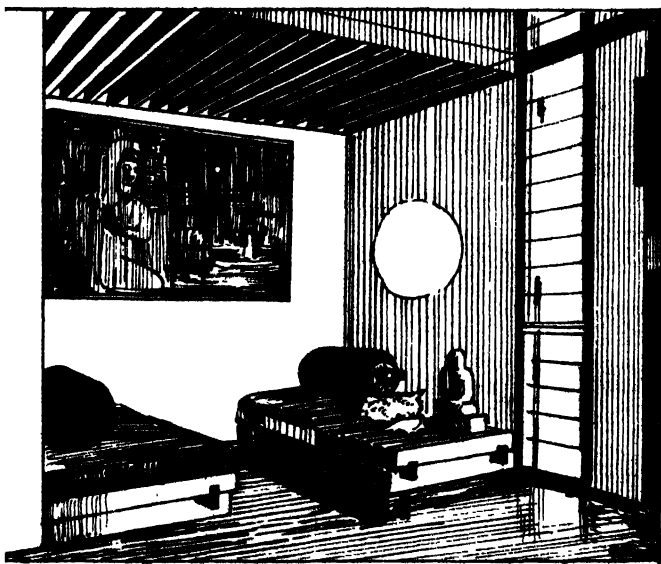


Fig. 86—View of reception alcove.

As regards detailed planning, the main entrance is on the right hand side of the living room, indicated by the three steps, leading to the small reception alcove in front, in which two cushioned seats are arranged on each side leaving ample leg room between (See Fig. 86) for casual talk with visitors. The living room is spacious and has two tall, narrow windows at corners of the northern wall and a long sofa between them

(See plan). Besides, there are six small windows in the form of square holes closed by tilting shutters pivoted at both ends horizontally at centre (See elevation). The kitchen is very compact and modern with a raised chulla platform, and a sink, and cabinets below and above it. Another unique feature is a counter with four cushioned stool seats in front. (See Fig. 87.) Below the counter on the kitchen side are storage shelves. The arrangement of the counter just on the border of the kitchen space, and

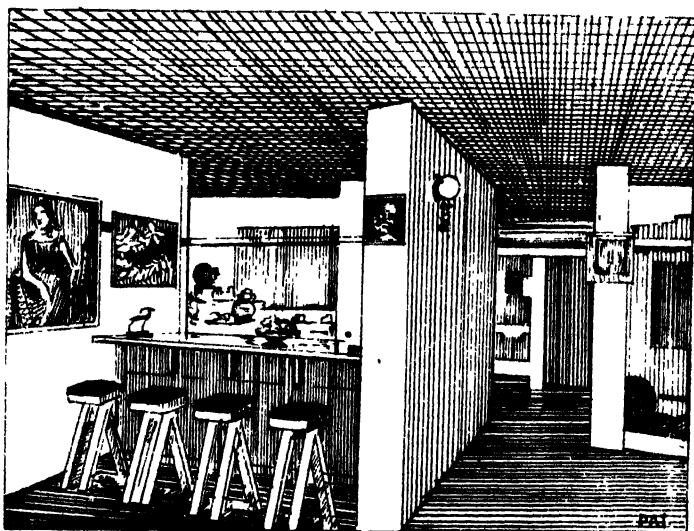


Fig. 87.

Figure showing the arrangement of the kitchen and dining counter.

the cushioned seats just inside the living room, have resulted in saving a large space for dining usually provided in a living-cum-dining room, besides making it very convenient for the housewife to serve food. There is a subsidiary entrance in the kitchen.

There are two bed rooms of adequate size—one behind the kitchen, and the other behind the reception alcove. Each bed room has three windows placed in opposite walls so as to ensure excellent cross ventilation. Spacious built-in wardrobes are provided between the corner windows. The bath room and w. c. are centrally situated, and are independently accessible from any room. The w. c. though in the centre is concealed from view from the living room. A lavatory basin is provided in the passage, just near the entrance to the bath room.

Thus considered from any point of view, maximum use is made of the available space to the best advantage of the members of the family.

PLAN NO. 24

BUILT-UP AREA 1024 Sq. Ft.

Here is a very compact, rectangular, simple plan suitable for a long and very narrow building plot. Its front covers a width of only 20' 6".

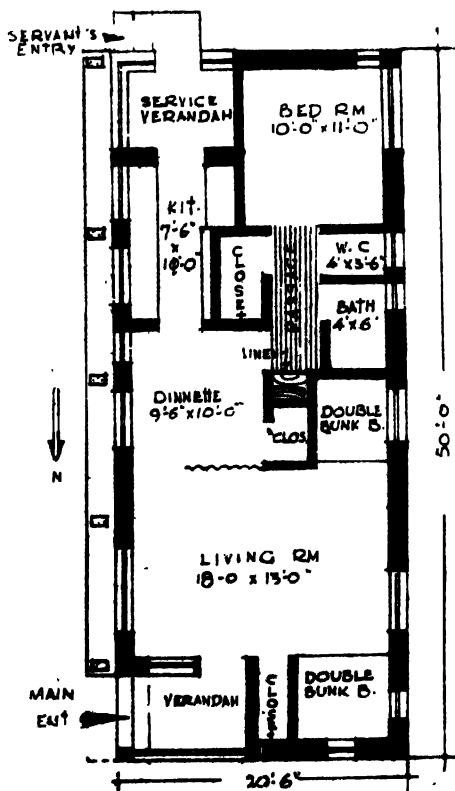
The entrance is through a small verandah, which leads to a living room. Upon entering the living room, one finds a closet on the right hand side, for putting hat, overcoat, umbrella or a stick. The living room of 18' x 13' is very large—in fact disproportionately large for such a small cottage, and when combined with the dining space and the two double bunks at sides, it occupies nearly half of the total floor space of the building.

The plan is very compact and economical. This will be seen from the fact that a mere 9 ft. length of the central passage makes every room independently accessible. Though there is only one bed room, the living room can easily accommodate occasional guests who come to stay for a night or two. Besides, the double bunks of full 6½ ft. width, one of them with two windows, and the other with one for ventilation, would provide accommodation for four people. This is a special feature worth copying in small cottages. They are shown to be closed by ordinary cloth curtains in the plan, and therefore do not provide the privacy of a real bed room. But it is possible to close them with overhead rolling, or side-wise folding shutters of hard boards, in which case each bunk will serve as bed room with double mattress.

The kitchen is large and modern in design, and has the added convenience of a service verandah with a rear exit. The two large-sized closets solve the problem of storage, and if a large loft is built on the top of the bath, w.c and the passage, including the large closet, ample storage space would be available.



Fig. 88



PLAN NO. 25

BUILT-UP AREA 1032 Sq. Ft.

The very compact and easy-to-run house represented by the plan on the opposite page is intended for a hill station.

Just at the entrance there is a closet, or cloak room with a large mirror on the face, useful for hanging overcoat, umbrella, etc. The living room in front is large enough, with a fire place. There are two bed rooms and a study room. The latter can be converted into a third bed room at a moment's notice. Every bed room is provided with built-in closet. The master's bed room has two closets.

The kitchen of 16' x 9' is large enough to normally accommodate a dining table and at least four chairs. All the modern equipment including a refrigerator and a double sink—one for hot and the other for cold water, facing two windows. In addition to an Indian type w. c., there is a large bath room equipped with a bath tub, commode, and a lavatory basin.

Besides the main entrance there is another to the kitchen. Every room is independently approachable through the small central lobby.

The exterior is as beautiful as could be desired. As the bungalow is intended for a hill station, a tiled, sloping roof is indicated.

The bungalow is most economical with not a single square inch of space wasted, and is very easy to run.

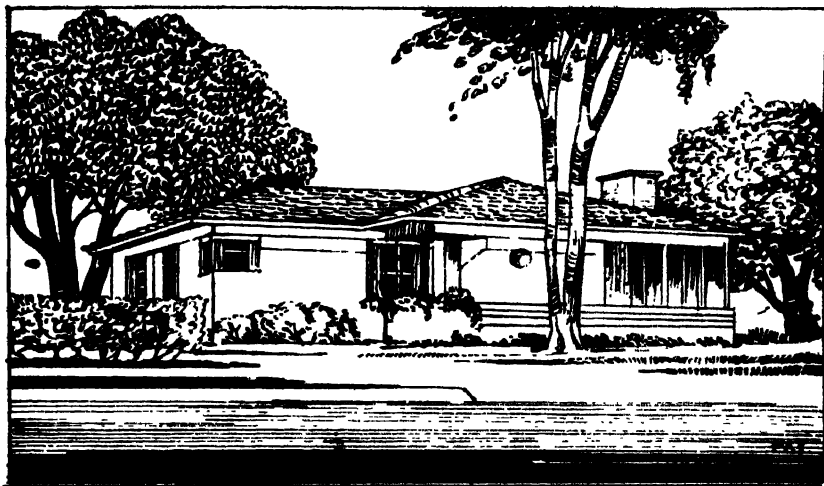


Fig. 90

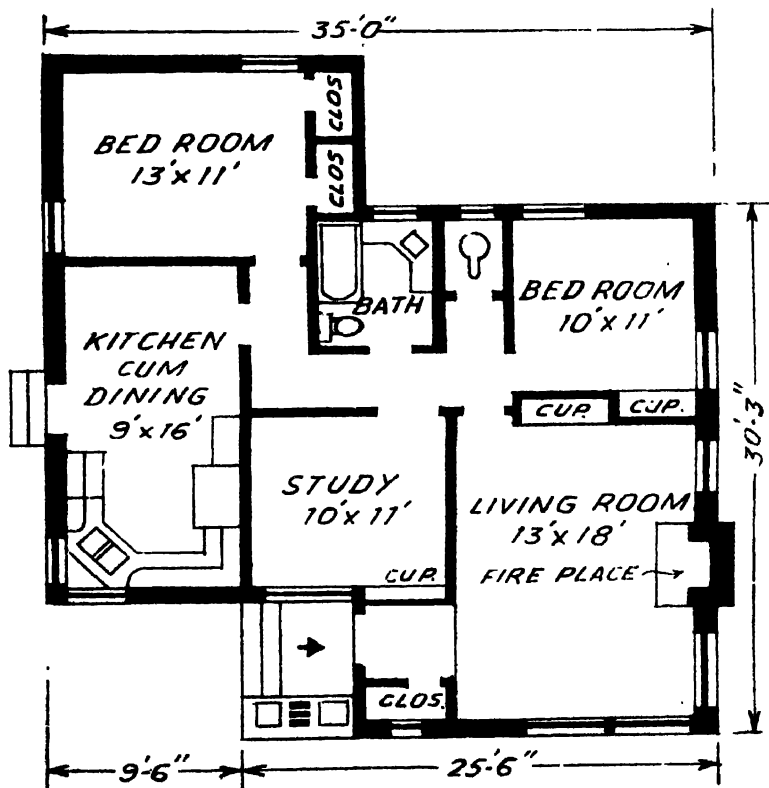


Fig. 91

PLAN NO. 26

BUILT-UP AREA 1057 Sq. Ft.

The plan of this simple rectangular building is based on sound common sense, which is sure to appeal to the practical man or woman.

There is a six ft. verandah at the front entrance which can be widened by another five ft. in times of need under the extended sun-shine roof. The living room of 16' 6" x 11' is admirably proportioned, and is spacious enough. One pleasant feature of this is that there is an almost full side window on the south divided into three panels, which heightens the feeling of spaciousness. The small dinette is linked with the living room and kitchen. The kitchen and dining room are in the front, and therefore to preserve their privacy the wall is blind. The kitchen is very well fitted with cabinets, shelves, and work table. Besides there is a small store room attached to it. The bath room and w. c. are very conveniently placed, and are of ample sizes. The bed rooms are grouped together on the West side, and are provided with built-in cupboards of ample size. The small lobby affords excellent circulation with independent access to every room.

Even a casual observer will be convinced by looking at the plan that it is most practical, particularly labour-saving for the housewife.

The elevation breaks away not only from the conventional, but also from the modern architecture. There is a flat roof on a part and a concrete sloping roof on remaining house.



Fig. 92

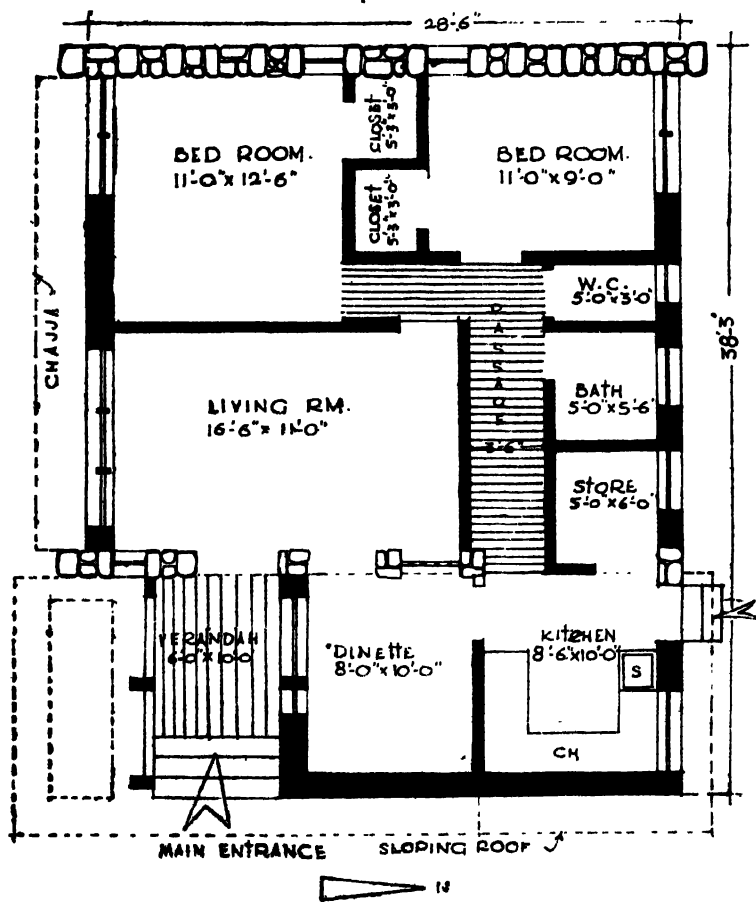


Fig. 93

PLAN NO. 27

PLINTH AREA 1280 Sq. Ft.

This is a plan of a simple rectangular, compact house very skilfully designed by the architect, for comfort and convenience, with special attention to economy, both in design and construction.

Its special merit is that within such a small area he has successfully provided independent, self-contained flats for two families. The larger flat contains two bed rooms, living room, kitchen, bath and w. c. for a normal-sized decent family, and the smaller contains a kitchen, a bed-cum-living room, bath and w. c. for a small family of husband, wife and a child. If required, the bed room opposite the kitchen can be added to the smaller flat, or the entire ground floor can be occupied by one family, to form a home of four bed rooms, with two sets of sanitary services. The space occupied by the passage is very small.

At the entrance to the main flat, there is a small vestibule closed in front by a wide door and a fixed ornamental w. i. grill, which lends a charm to the entrance. The living room is spacious enough. Both the bed rooms are of good size, and are provided with built-in wardrobes. The kitchen with a large double window, raised platform for chulla and a sink, and cupboards is modern.

The smaller flat has a separate entrance, and consists of a bed-living room, a kitchen and sanitary services, and is capable of being enlarged with the addition of a bed room to which separate access has been provided.

In the main flat a broad, easy staircase to which there are two entrances—one from inside through the living room, and the other from the outside, is provided. This provision is for the future, so that if one or more floors are raised exactly like the ground floor they can be let using outside entrance, or, if the owner has to build some rooms or the whole floor on top, for his own use, the inner entrance would be useful, reaching the foot of the staircase from below the middle landing.



P. 169

Fig. 94

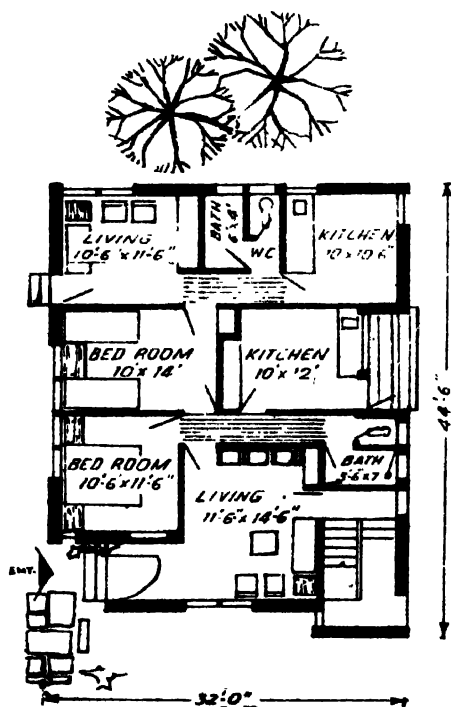


Fig. 95

PLAN NO. 28

BUILT-UP AREA 1210 Sq. Ft.

The first impression created by this beautiful house naturally excites an expectation that it must possess equally good arrangements inside. But one is very much disappointed. It is a total failure, and it is demonstrated here to show how appearances are deceptive.

Though the built-up area is as large as 1210 sq. ft. there is only one small bed room, which has only one cupboard hardly 9 in. deep. Compare with this the Plan No. 15 of 810 sq. ft. built-up area which has provided two bed rooms, and Plan No. 20 of 915 sq. ft. area which has three bed rooms with large built-in wardrobes. The kitchen is large enough, but of conventional type. The dining room is too large, and is lighted by the borrowed light through the verandah. It is intended to be used also as a sitting room. But when there is such an excellent verandah and a living room there is no need for it. In such a large drawing room there is scarcely any place for a sofa set. Either the window, or door or a cupboard comes in the way. The same is the case with the bed room. In the original plan there is no w. c. I have made an alteration and shown a w. c. and bath room there. The bath attached to the bed room is too small. The 5-ft. verandah in front of the dining room serves no purpose. There is no privacy even in the bed room, which opens both in the verandah and dining room. The circulation is bad. For reaching the bath room or the staircase from the verandah or dining room one has to cross the drawing room. There are too many corners, and so on.

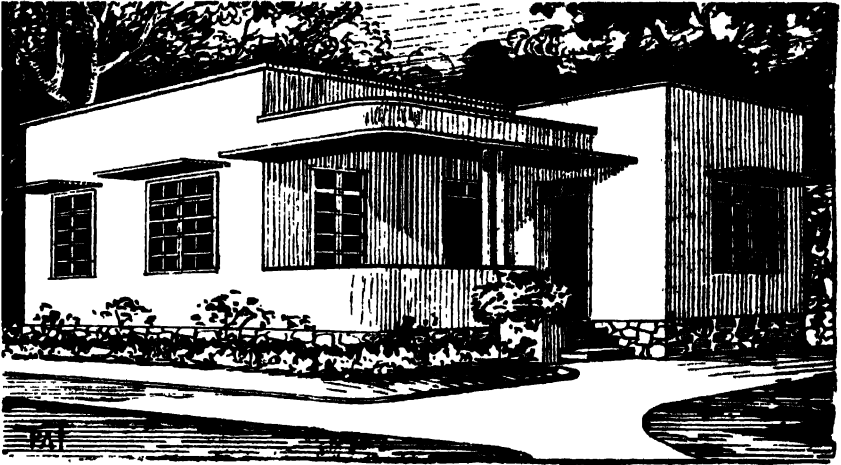


Fig. 96

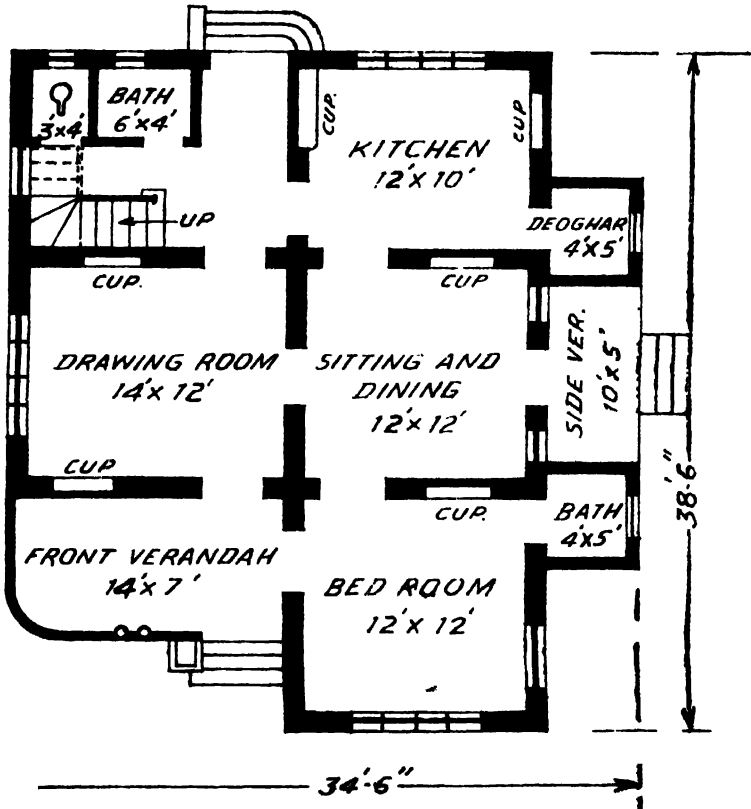


Fig. 97

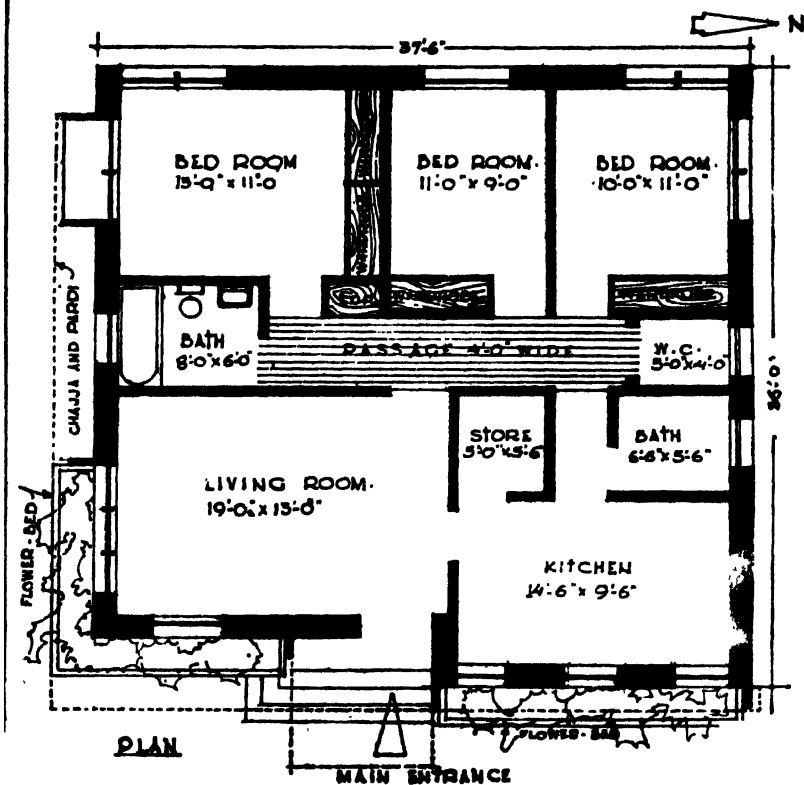
PLAN NO. 29

PLINTH AREA 1320 Sq. Ft.

The first impression caused by the attractive exterior of this square building excites a promise, which is certainly fulfilled by the trim, well-arranged, orderly interior. It is really surprising that within an area of a little over 1300 sq. ft. three bed rooms, one spacious living room, also a spacious kitchen with its small store room, and two bath rooms—one of them on western style with a bath and commode are provided. Some municipalities do not allow even a store room of less than 100 sq. ft. area, in that case this should be called a Pooja room, for which this is also an ideal place. A single short corridor communicates with all the rooms, and sanitary services on both sides. Every bed room is provided with its own built-in wardrobe. All the three bed rooms are in a row, flooded with western breeze, as the house faces East. The kitchen in the N. E. corner will be pleasantly warmed, and its air purified by the morning sun, and will remain cool in the evening. The bed rooms are a bit small, but, in a house of a large family more rooms are required, no matter how small they are. The 14' 6" long kitchen should easily accommodate a dining table and four chairs. The kitchen is in the front, but, when the door communicating with the living room is closed its privacy will not be disturbed. On the contrary it would be easy for the housewife working in the kitchen to keep an eye on the entrance.

The plan is straightforward with no recesses, or projections. The beauty of the exterior is enhanced by the built-in inviting flower boxes in the front and left hand corner. The elevation is modern.

The bungalow planned on the basis of sound common sense will certainly appeal to the practical man or woman.



Figs. 98 & 99

PLAN NO. 30

PLINTH AREA 1325 Sq. Ft.

This is a plan on rather a more pretentious scale intended for a large decent middle class family of 7 or 8 members. Though compact, there is nowhere the slightest feeling of being cramped. The real test of a good house is that it must be easy to run and keep clean. The living room though small is linked with and yet separated from the dining room by means of a few tall indoor plants in pots, which lend privacy, as well as freshness and liveliness to both the rooms. The kitchen which is the hub of the house is integrated with the dining room on one side, and with a small store room on the other. The sink in which vegetable and other things are washed and cleaned is placed just in front of the window, and there is a drain board slightly inclined towards sink fixed in the corner. All the three bed rooms are grouped together as a private unit on the right hand side of the entrance passage, and are provided with two modern bath rooms of very good size to accommodate a commode, bath tub, lavatory basin, and a towel rail, and a shower (these are not shown in the plan). The sizes of all the bed rooms are very good, and each is provided with its own built-in wardrobe. There is, besides, a large closet for storing family linen. The central passage communicates with all the rooms, and both the bath rooms.

The building should face the North, with a slight inclination of 15° to 20° towards the South.

The exterior though simple, has the quiet dignity and its charm is heightened by the flat roofs at different levels on top of the rooms. The entrance vestibule has its own projecting roof at a still lower level.



Fig 100

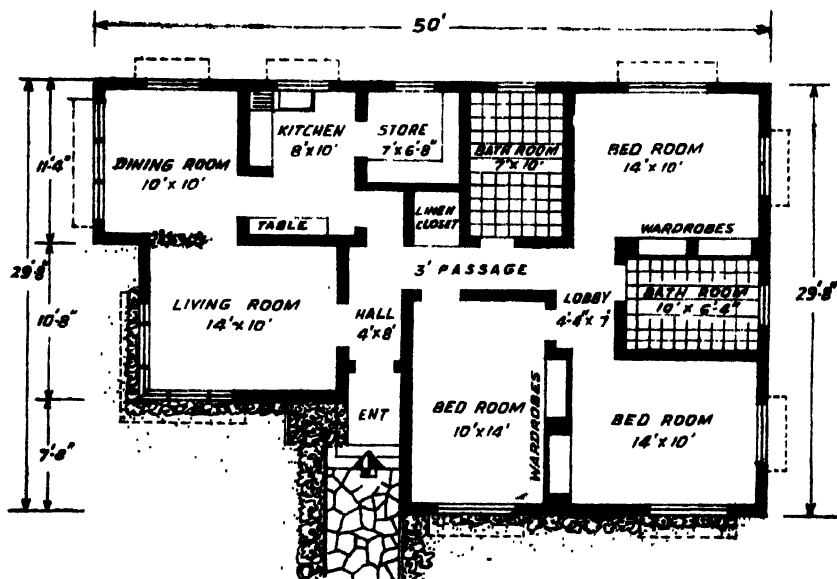


Fig 101

PLAN NO. 31

PLINTH AREA: 1,380 Sq. Ft.

This is a compact plan of nicely arranged rooms suited for a building plot facing north. The elevation also is modern and artistic. The special feature of the plan lies in the fact that every inch of the space is utilized, the only area occupied by a lobby is that of a few square feet in front of the bath-room, and yet every room is independently approachable. The bath-room is so situated that it can be reached independently from any room.

There is a small verandah in front; if funds permit, it may be made 7' 6" wide, at least, so that it would function better as a verandah for all its legitimate uses. It would be well if an access to the dining-room could be provided from the verandah by the provision of a door just in front of the entrance steps. The drawing-hall of 12' x 17' is indeed a luxury for such a small cottage. There are three bed-rooms including the ladies' room, all of adequate size. There are clothes closets of ample size provided in two bed-rooms, and one extra near the bath-room in the lobby. A closet for keeping clothes of daily homewear, after they are washed and dried every day, is very handy near the general bath-room in the home of a middle class family. The store-room of just sufficient size for the typical small cottage is conveniently placed near the kitchen. A back entrance to the kitchen is a necessity and has been provided. The dining-room with two double windows in two walls is spacious enough. As the cottage is designed for an up-country town, no sanitary closet is provided inside.

This plan is taken from the previous edition. In order to bring it in line with the present trends of modern architecture, remove the *pucca* partition between the drawing and dining room, and replace it by one which could be folded, or simply by a screen.

The outer walls are of brick in lime, 14 inches thick, plastered also on the outside, and all inner ones are partitions six inches thick, including plaster on both sides. There is an R. C. C. canopy over the front verandah which is over-hanging from the wall and has no supports at the outer end.

The plan, as it is, might suit a western aspect.

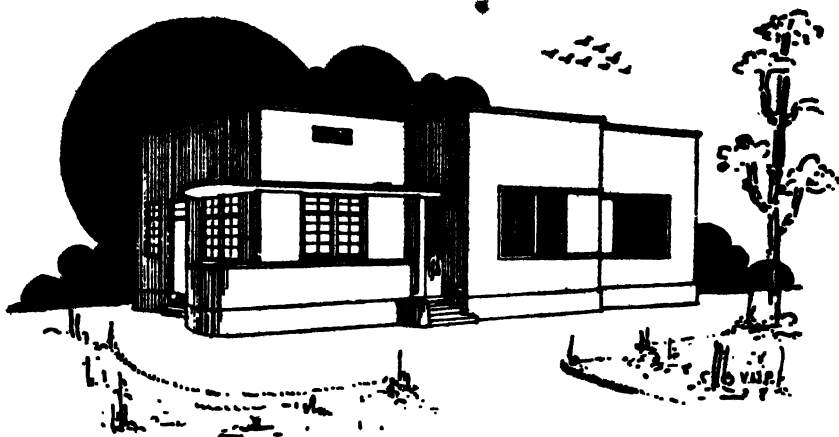


Fig. 102

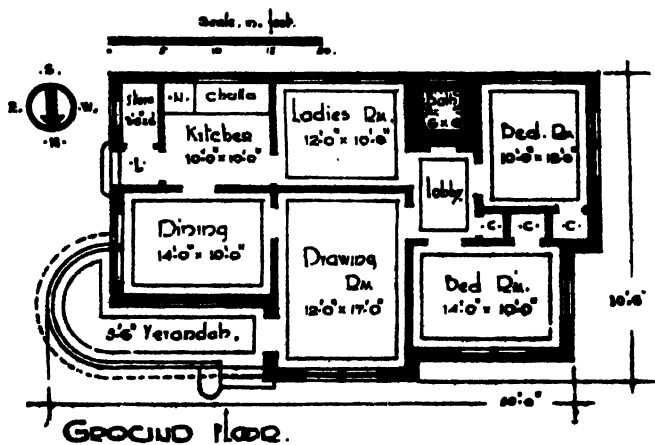


Fig. 103

PLAN NO. 32

BUILT-UP AREA 1452 Sq. Ft.

Three good-sized bed rooms, a spacious living room, with a dinette separated by a screen, a modern kitchen, a store room, and a verandah, besides a well-equipped bath room on western style, and an Indian type w. c.—all this within an area of 1450 sq. ft. is really surprising; but it has been actually achieved in the plan on the facing page without producing cramped effect anywhere. Every bed room has its own built-in wardrobe, besides there are two large cupboards for storing family linen.

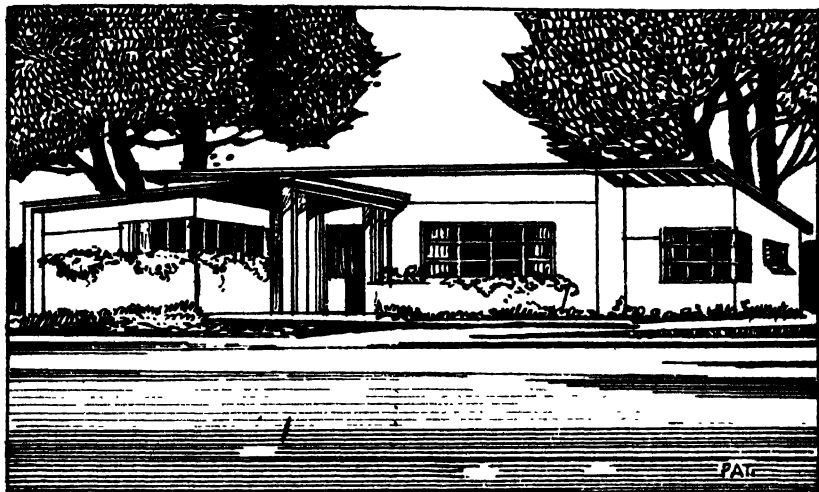
The kitchen of 16' x 8' is spacious and of a convenient shape to accommodate four light chairs, and a folding table for meals. In that case the dinette can be easily converted into a study room, or even a temporary bed room.

There are two rear exits, one through the kitchen and the other through the middle bed room. The three bed rooms with the sanitary services common to them, form a private unit on the left hand side, the privacy of which is strictly preserved by the verandah and the entrance vestibule.

Ideally free circulation is the special feature of the plan. This is achieved by providing a passage about ten ft. long, and skilful grouping of rooms.

The elevation is very attractive. The tiled roof imparts a snug, cosy appearance though perhaps a flat roof might give equally good effect, and besides be much simpler, and also cheaper.

An altogether economic, pleasant and easy-to-run house of which the owner should rightly feel proud.



P. 179.

Fig 104

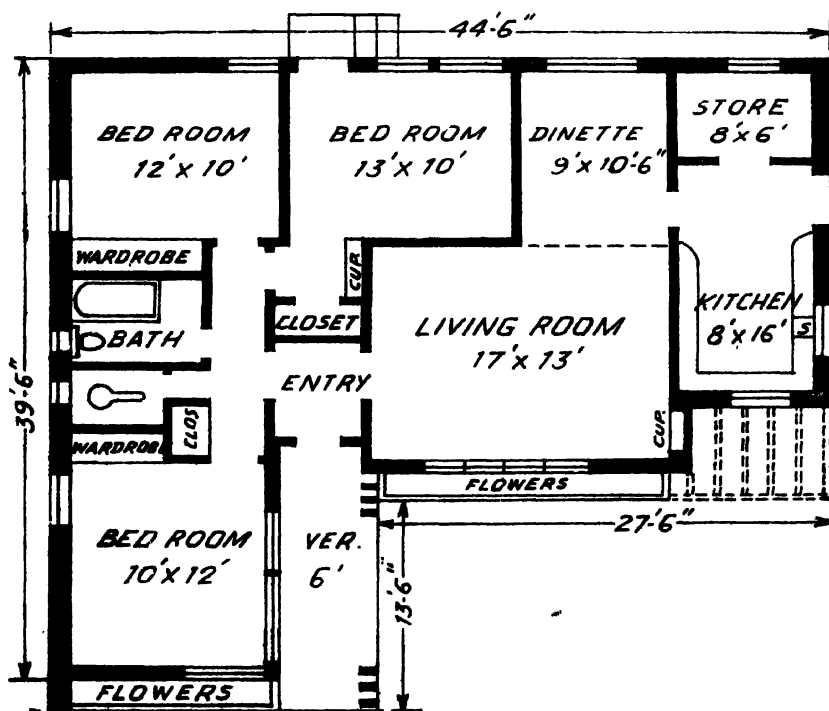


Fig. 105

PLAN NO. 33

BUILT-UP AREA 1455 Sq. Ft.

The lay-out of this simple rectangular house is very practical and saves labour. The garage is an integral part of the house. The paved terrace in the front gives an appearance of spaciousness, and affords access on the left hand side to the garage by a sliding door, and on the right hand side to the drawing room. The kitchen, dining room and the drawing room form an active unit, which is separated from the rest of the house by a passage. The dining room is linked with the drawing room by a curtain. The drawing room of 11' 6" x 20' 0" is well proportioned. The provision of a conservatory in front of the dining room is a special feature. The kitchen is of ample size and is equipped with modern fitments. The bath room with an English bath and a commode is very conveniently situated with respect to other rooms. Besides this there is an Indian type w. c. There are two bed rooms and a small study room. All these are equipped with separate closets. The positions of the usual pieces of furniture are shown on the plan. There is a service entrance in a corner of the kitchen for the supply of fruits, vegetables, bread, etc., without disturbing other rooms.

The outer walls are load-bearing, and thick enough to afford protection of the inmates from the inclemency of the weather.

The exterior view, which breaks from the conventional has a rural out-look. The building faces South-east and has a frontage of 48 ft.

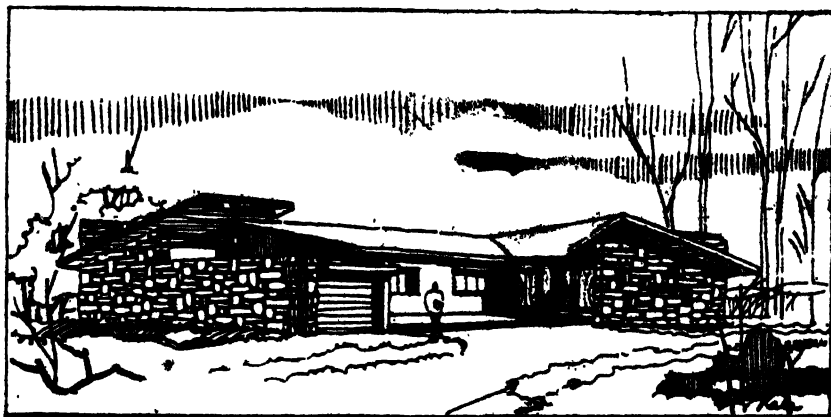


Fig. 106

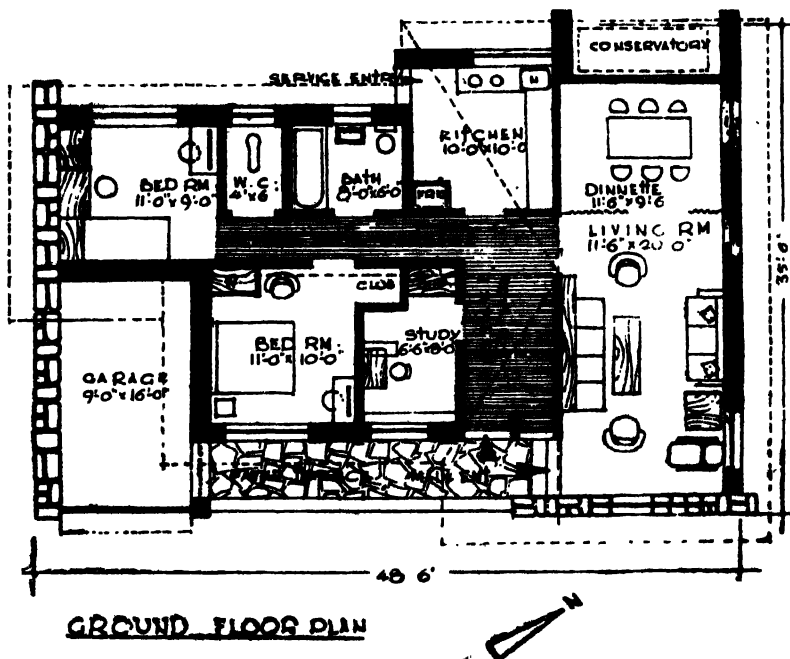


Fig. 107

PLAN NO. 34

BUILT-UP AREA 1460 Sq. Ft.

This is a plan of a simple flexible bungalow of three bed rooms. The simplicity of the design is particularly noticeable inside, yet, nowhere there is a suggestion of austerity.

The living/dining rooms, kitchen and front verandah forming one unit may be called the active part of the home and is grouped together and well intercommunicated. The unusual feature of the kitchen is that it is placed in the front. Some people like this arrangement and others do not. If the entrance door to it from the verandah is normally kept closed, complete privacy of the room is preserved. There is the added advantage that the lady working in the kitchen can keep an eye on the people entering the house.

The drawing room is rather of unusually large size for the small house, and when combined with the dining space and the verandah in front it becomes still more so. The servant's entrance on the left hand side of the dining room is very convenient. The 7-ft. verandah at the entrance protected by the projected wide canopy, from the sun and rain, will be very useful for many purposes. Similar long canopy protects the wall of the two bed rooms in a row. Every bed room is provided with its own spacious built-in closet. The large closet with wide shelves in it behind the dining room would afford a good storage space. There is another similar closet, though a bit smaller, in the drawing room on the other side of the passage.

If at any time, another floor is contemplated to be built on the top of this bungalow, a convenient place for a dog-legged staircase would be in front of the side entrance in the dining room. If the same arrangement of rooms is made as on the ground floor it can be rented out as an independent flat for another family.

PLAN NO. 35

PLINTH AREA 1502 Sq. Ft.

Though the plan of this house is simple and straightforward, the architect has given to the exterior an atmosphere of gaiety, dignity and luxury. It gives an illusion of a large, luxurious house, but in fact, it is planned very skilfully for a large family of average means. Within the compass of about 1500 sq. ft. of built-up area it gives a surprisingly large accommodation with all the elements of comfort, at a remarkably low cost; All the units are cleverly integrated into a simple design, the key being the central short Z-shaped lobby, affording the best possible circulation. Three bed rooms, each with two built-in closets, a spacious drawing room, a dining room, a kitchen, store room, and a 16' x 7' verandah! What more can one expect within such a small area? The living room is separated from the dining room by a curtain, which when drawn, will throw the two rooms into one for the purposes of entertainment. The spacious verandah is a unique feature. As it is placed on the South it would prove to be an excellent sitting room in the cool breeze in the evening, and would allow 4/5 beds to be spread across when a party of friends pay a visit. The grouping and orientation of rooms is as good as can be desired. The kitchen with a store room on the back and a dining room in the front and generously fitted with cabinets and cupboards is completely labour-saving. The bed rooms are small, but very conveniently placed, and afford all the necessary privacy. The flower boxes projecting from the windows on two sides enhance the beauty of the elevation.

Par excellence is the epithet which could be applied to the bungalow—a house, the owner can justly feel proud for.

PLAN NO. 36

BUILT-UP AREA 1616 Sq. Ft.

This four-bed-roomed house is one of the most compact ones of medium size, for a large family. It consists of eight rooms, including the kitchen, and two baths. There is a front verandah 7 ft. wide at the entrance. The very small central passage—hardly 10 ft. long—has provided the best circulation in the entire house. The grouping of rooms is excellent. Every bed room, including the study, which also can be used as an occasional bed room, is provided with built-in wardrobes. Out of the two bath rooms one has an English bath tub, and the other has a shower, and both these are independently accessible from any of the bed rooms. The front verandah has its doors so placed that the entire area can be utilized without obstruction.

In addition to the main entrance, there is another, through the kitchen on the back side. Every room is most carefully designed with respect to the furniture which may go into it. In fact the positions of furniture are shown in every room. Every room except the study has two windows, so that there is cross ventilation all over. In addition to the cupboards in each room, there is one more in the passage, for storing common linen of the family

Thus considered from every point of view, the plan is ideal. There is no flaw anywhere, nor any compromise.

The elevation is modern. Its aesthetic beauty can be further increased by matching a colour scheme.

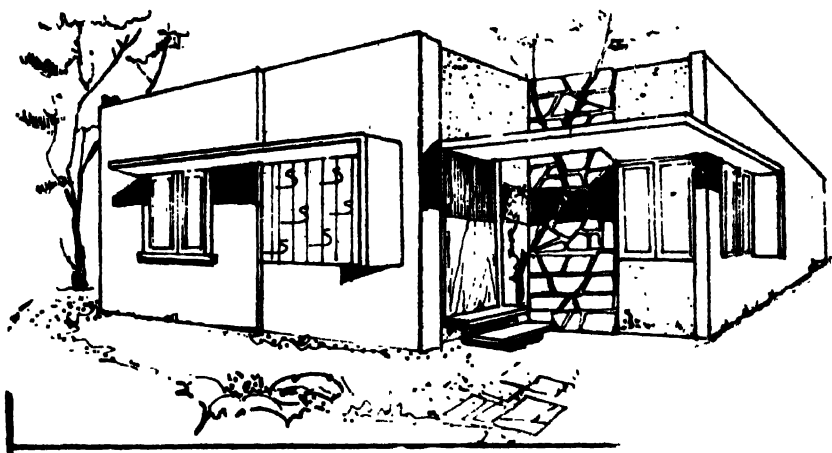


Fig. 112.

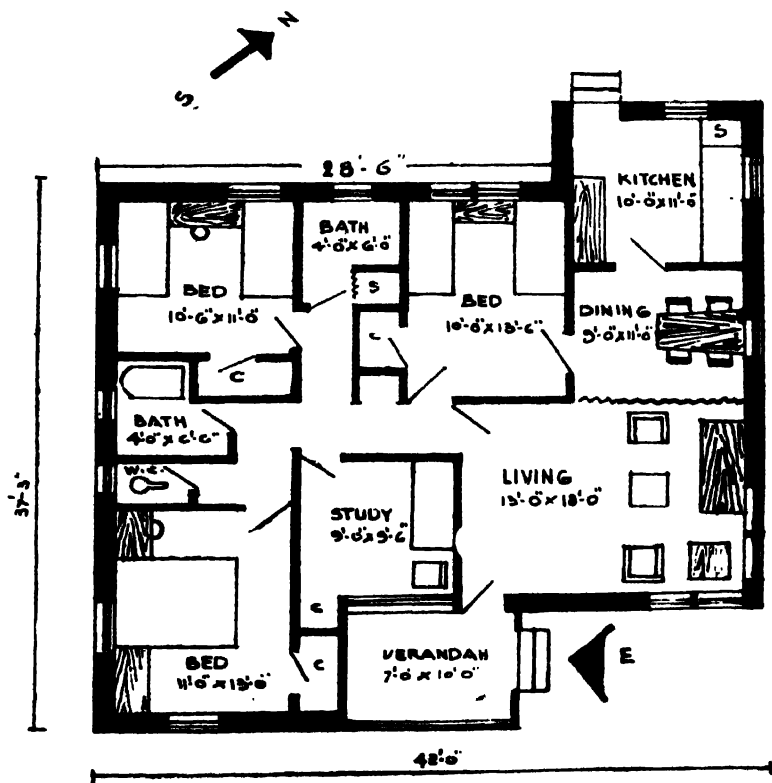


Fig. 113.

Architect: Mr. R. S. Bodhani, Poona.

PLAN NO. 37*

BUILT-UP AREA 1700 Sq. Ft.

This is one of the most attractive and beautiful buildings. It demonstrates what significant part concrete can play in modern architecture. In fact it is the soul of modern architecture.

A glance at the plan will show that the interior also is well-thought out, and is equally satisfying. Three good-sized bed rooms with attached bath rooms, a kitchen, a dining living room, and a 7-ft. verandah, all very cleverly integrated into a simple design, the key being the central lobby which gives a direct access to all the rooms. The unit of quiet areas (bed rooms and baths) is separate from the unit of active areas (kitchen, dining, and living). The grouping of every room is excellent. The dining room is close to the kitchen. The living room can be expanded by removing the curtain. The back entrance near the kitchen adds to the convenience. It will be useful for the servants. The housewife can also receive vegetables, bread, milk etc., from suppliers through it. The semi-circular verandah is the greatest attraction, which focuses the eye of on-lookers. It is an ideal place for games of cards or chess.

The house is easy to run, and keep neat and clean. There being no extra corners or recesses the construction would be economical. In the plan the walls are shown 8 in. thick of hollow concrete blocks, but brick or stone can be substituted with ease, only their thickness will be more. The house is sure to prove the pride of the family.

* Courtesy: The Concrete Association of India.

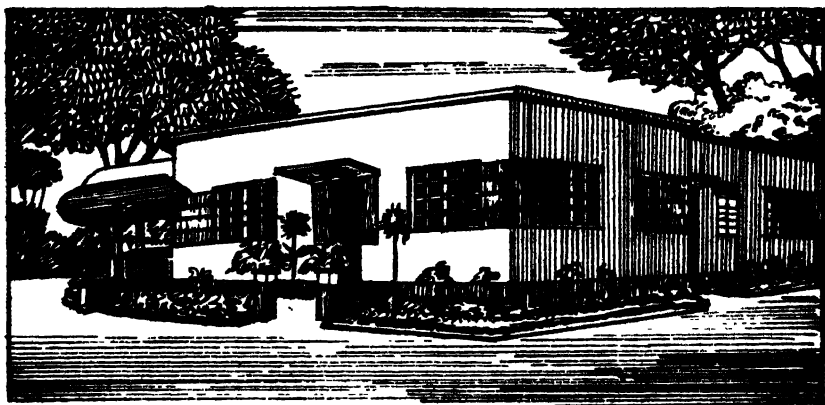


Fig. 114.

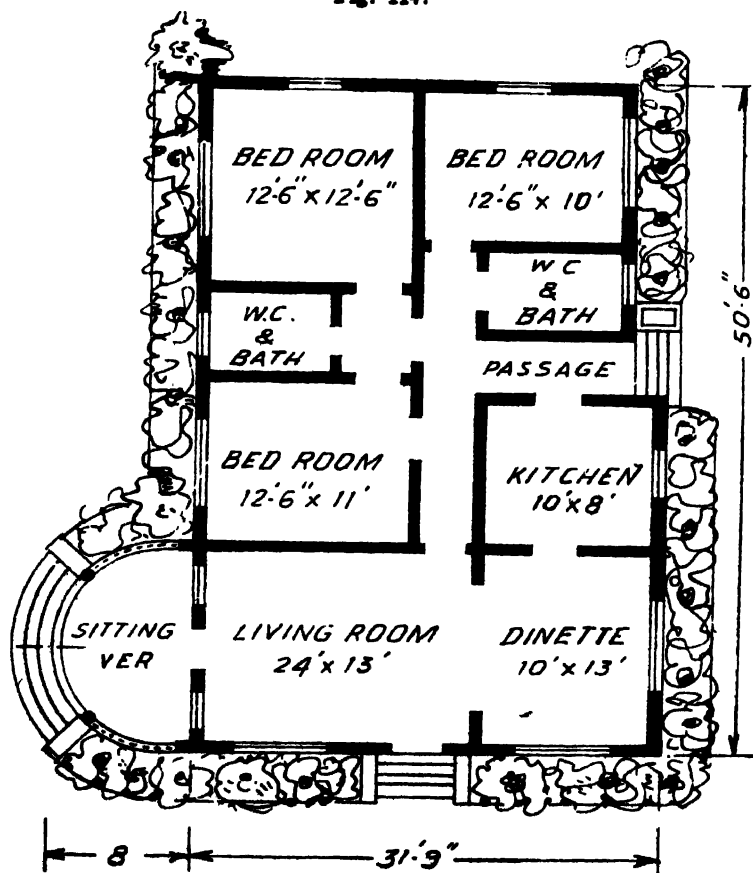


Fig. 115.

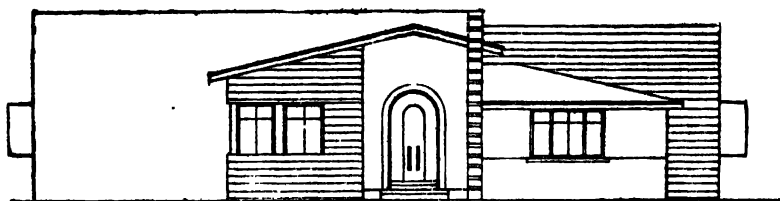
PLAN NO. 38

, BUILT-UP AREA 1745 Sq. Ft.

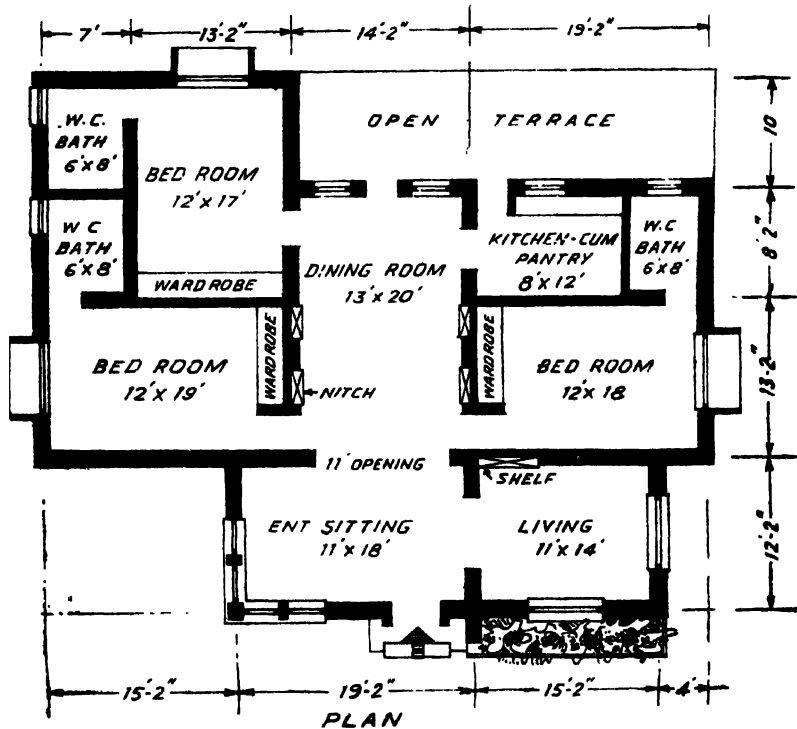
This house is designed on a more luxurious scale, though the question of economy is not lost sight of. The architect has shown that it is possible that by blending the contemporary with conventional architecture a most harmonious effect can be brought. The plan is designed more on modern lines. There is absolutely no common lobby or passage provided, and yet flexibility and circulation are as best as could be desired. Emphasis has been laid on strict privacy particularly in bed rooms, with provision of one large window in one short wall in every bed room. This has made it possible to arrange the beds and furniture at different places as one chooses. There are 2-ft. arms of wall projecting on both sides of windows in the bed rooms, which increase the privacy, and lend modernity. Every bed room has its private bath room attached to it, equipped with a commode, lavatory basin and European bath, the bed rooms have unusually large built-in wardrobes. The dining room of 13' x 20' is just like a state room. Besides it can be combined with both the sitting room and living rooms to accommodate a large gathering on festive or religious occasions.

The paved yard open to the sky on the rear side is a special feature which could be utilised for multi-purpose service. It would be an ideal place for outdoor dining on moonlit nights, for which there is also a door provided from the kitchen. It would also be an excellent place for outdoor sleeping in summer enjoying cool breeze.

The exterior, with its snug simplicity, and quiet dignity is most inviting.



FRONT ELEVATION



PLAN

Figs. 116 & 117

Architects: M/s Riasuddin Ahmed and Associates, Hyderabad

PLAN NO. 39

Plinth Area: 1550 Sq. Ft.

This is a conventional plan, found very convenient by actual experience. It is designed for a building plot with a southern aspect. All the three bed-rooms are $12' \times 10'$. The central main hall of $19' \times 12'$ is quite a spacious room. The kitchen is sufficiently large for the normal needs of cooking and dining of a small family. When a stranger or a guest is to be entertained, then the 8 ft. verandah would serve as a dining-room. If the kitchen were oblong, instead of square, it would have been better. The store-room adjacent to the kitchen is very convenient. The bath-room, w.c., and washroom occupy just the proper corner and are separated by a lobby.

If, in course of time, a floor is to be added on the top of the ground floor, a convenient location for the staircase would be in the verandah between the two bed-rooms on the west side. Thus the cottage is very convenient for a middle class family. The only defects in the plan are that there is no verandah on the front side and that the space of the back-yard between the kitchen and bed-room, where *Tu/si* plant is shown, is too narrow to remain cool, when the stone walls on both sides would radiate heat, though this could be considerably remedied by planting a shady tree or a bower to cast its shadow on the walls and the floor.

Note that the inner corners of the drawing-hall in front are rounded by a semi-circle. This is good, both from the point of view of appearance and sanitation, because dust and vermin are likely to collect in corners, otherwise.

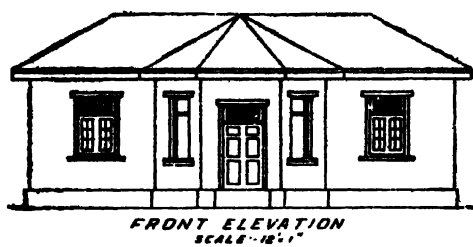


Fig. 118

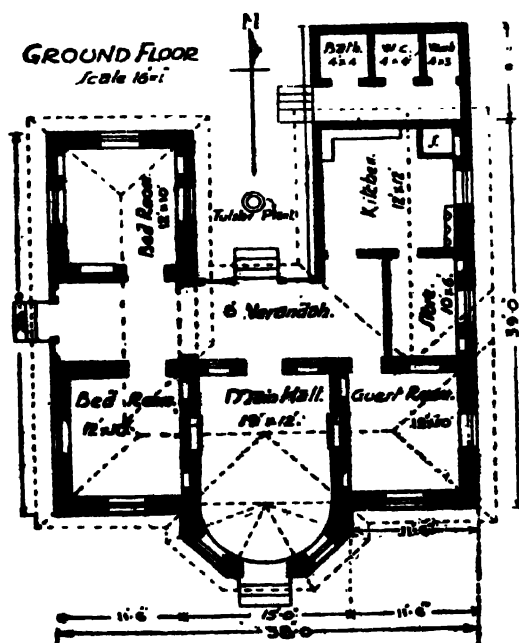


Fig. 119.

PLAN NO. 40

PLINTH AREA 1585 Sq. Ft.

This is a modern design planned for economy, beauty and comfort, suitable for a corner plot. It comprises three bed rooms, including the office room, a drawing, dining room, kitchen, store room, a verandah and two bath rooms. The building would look still better if erected on an elevated site, commanding view of the surrounding landscape.

Just at the main entrance there are curved concrete boxes for flower plants on either side, with one or two $\frac{1}{2}$ " pipes laid at bottom projecting an inch outside for drainage and aeration of plant roots. The 7-ft. curved verandah is attractive, and as it is closed by glazed shutters, it would serve as a sleeping porch. Behind it is a large-sized curved drawing room.

The plan is taken from the previous edition. It can be very much improved to meet the present day tastes by:

(1) Removing the partition which divides the dining room and the passage for the rear exit, and also removing the closet in the left hand corner of the drawing room.

(2) Removing the partition on the left of the kitchen, and putting it across the dining room in line with that on the right.

(3) Removing the cross partition between the drawing room and bath room.

(4) Substituting the fixed partition between drawing and dining rooms by a folding one.

All this will result in making the drawing-cum-dining room $30' \times 14'$, and enlarging the kitchen, sufficiently to provide 2 or 3 seats for dining.

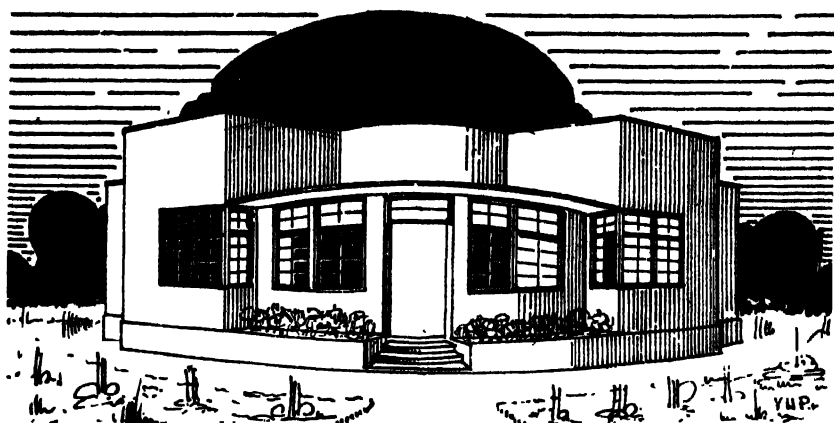


Fig. 120.

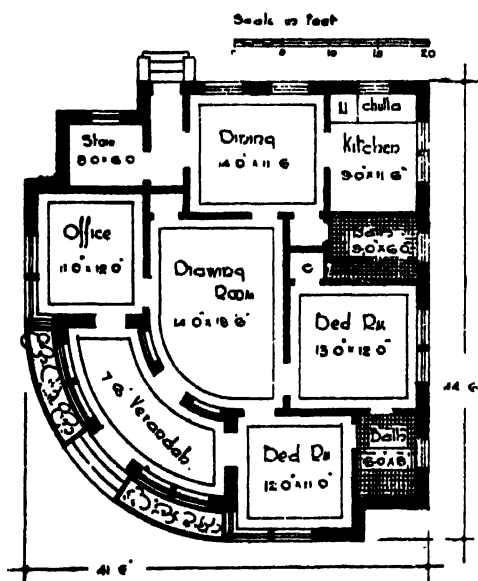


Fig. 121.

PLAN NO. 41

PLINTH AREA: 1,874 Sq. Ft.

This design represents utility, simplicity and all modern comforts, and would suit a family whose motto is plain, unostentatious living. It is a compact plan with square corners and devoid of all ornamentation. It would suit a north, north-west, or western aspect. There is in front a 7 ft. verandah, behind which is a spacious and well-shaped drawing-room. The kitchen, store and dining-room are grouped together in an ideal manner. A work verandah near kitchen is very essential and is provided here. The bath-room is very centrally situated and occupies such a place that it is hidden from sight from the drawing-room and is still accessible independently from any room. All the four bed-rooms are of a good size and are grouped together on one side, on which they will be flooded by the western or south-western breeze. Every room has got a built-in clothes closet of its own, of a spacious size. The closets are so arranged that they form hollow walls separating one bed-room from another and thus preserve the privacy in respect also of sound.

Every room has a minimum of two windows; there is very little space wasted in passages, and yet, every living room has an independent access. Thus the cottage is one of the instances of what could be achieved in a small area by skilful planning, and there is no doubt that a cottage like this should prove the delight and pride of the family occupying it.

A large, middle-class family requires a large number of rooms—it does not matter if the sizes are small—and this is exactly what is accomplished in this plan. Besides all the usual accommodation normally required, this cottage supplies four independent bed-rooms, and that, in a small space of less than 1,900 sq. ft.

Remove the partition between the drawing and dining room, and substitute it by a folding one or use a curtain, to make it up to date.



Fig. 122

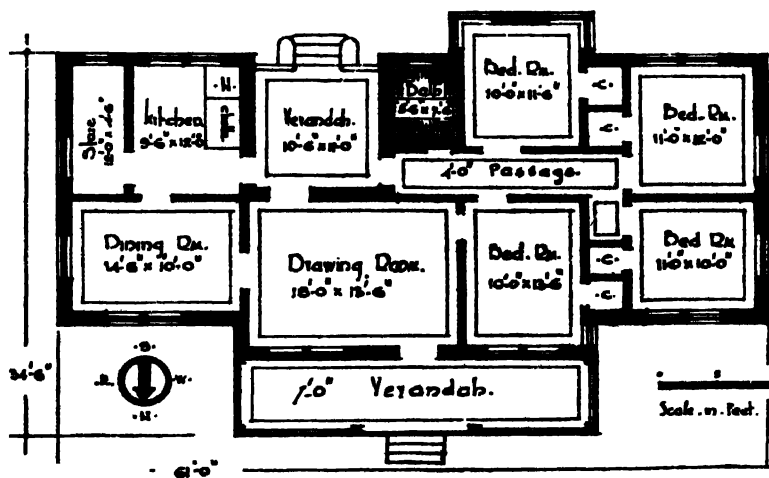


Fig. 123

PLAN NO. 42

PLINTH AREA: 1,900 Sq. Ft.

This is a design of an artistic home, specially planned for convenience and comfort. It is suitable for a south or east facing. The main entrance in the front is at one end of the verandah, instead of one usually in the centre. The entrance at one end is more convenient as very little space is engaged in the passage, and the remaining area of the verandah is available for occupation. The front verandah extends in a semi-circle on the right-hand side, which allows more space, looks more artistic, and costs very little extra amount, since the circular part is roofed by an over-hanging canopy without an additional post to support it. All the bed-rooms are arranged on the side commanding the breeze. The sizes of all the bed-rooms are very good. The small longitudinal lobby gives an independent access to every bed-room, and also leads to the bath-room. One special feature of this design is the folding partition between the drawing- and dining-rooms. The house was designed for the family of a busy man dwelling on the outskirts of a large commercial city. In the family of such a man a large dining-room is required only on special occasions or perhaps on Sundays and other holidays, when all the members of the family might sit together and dine. Hence, for the sake of economy, the drawing-hall proper is reduced and is combined with the dining-room by providing a folding partition. Thus for a dinner party or for special, social or religious congregations, one large hall of 16 by 23 ft. would be easily available.

The long passage between the kitchen and bath room is intended for giving access to the w.c. only. If the latter be on flushing system, it can be built just alongside the bath room, thus causing incidentally a saving also.

Similarly the pantry, which is unnecessary with the modern way of living, may be dispensed with, and the kitchen made larger, (11'×16') which will then provide space inside the kitchen for 4 seats for dining, and also an exit on the rear side.

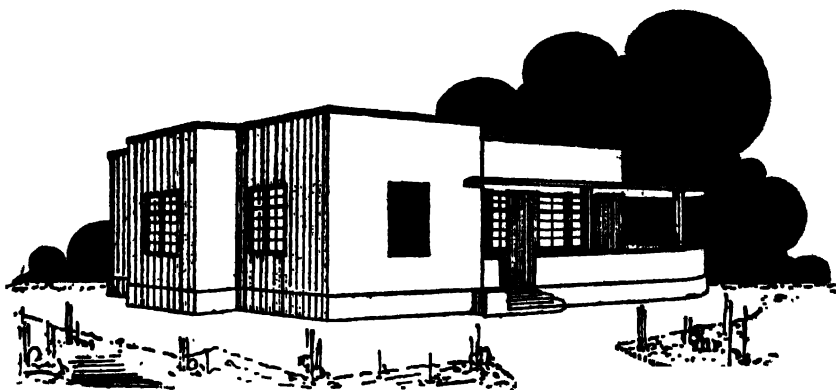


Fig. 124

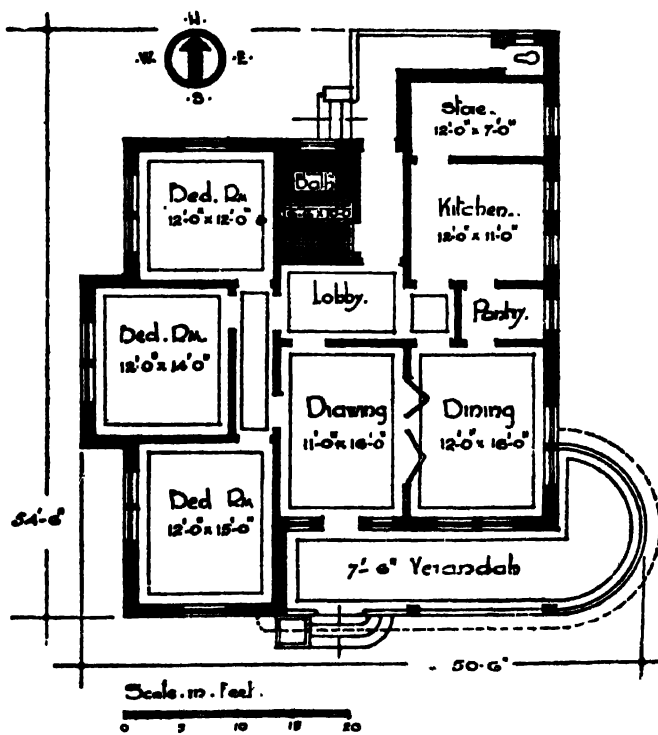


Fig. 125

PLAN NO. 43

PLINTH AREA: 1,900 Sq. Ft.

This is another design of a very convenient, comfortable and compact home which will appeal to a person of middle class having a large family. The sizes of rooms, except perhaps those of the dining- and drawing-rooms, are not large, but the number of rooms including the front and back verandahs is nine. It is designed for a northern aspect, still it might suit even a west or north-west facing plot.

The bed-rooms are arranged on the side of the prevailing direction of breeze, as a quiet unit, and service rooms, such as kitchen and dining, on the east, so that the kitchen odours and smoke may be kept out. Another advantage of this is that the kitchen and dining-room would get plenty of pleasant and cheerful sun in the morning, and in the afternoon and evening these rooms would remain cool. Every bed-room is provided with a clothes closet, so that no extra almyrahs or even pegs need occupy any space out of the bed-room. Besides these there is a large closet opposite the bath-room for storing general linen of the family.

Two bed-rooms have corner double windows in two sides ensuring breeze at all times. The dining-room is spacious enough and has a circular bay-window.

To suit the modern way of living the partition between the drawing and dining room should be substituted by a removable, light, folding framed screen.

The work verandah near the kitchen is a necessity rather than a luxury in the houses of the middle-class families. It is useful for getting corn ground or spices pounded, off and on, and for many other family activities.

Thus the house is very convenient and comfortable, still there are too many corners which are bound to increase the cost. The circular bay-window in the dining-room and the corner windows in bed-rooms are further items to increase the cost.

The outer walls are of brick in lime 14 inches thick plastered on both the surfaces. The partition walls are also of brick in cement mortar (1 to 6) six inches thick including plaster on either side. The height of the ceiling is ten feet above the plinth level. The roof is of the flat terrace type with 4½ inches R.C.C. slab with a rendering of asphalt felt at top for water-proofing.

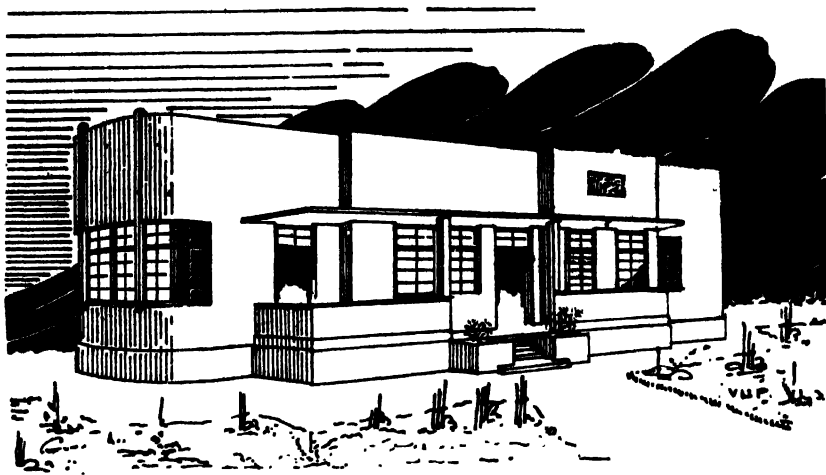


Fig. 126

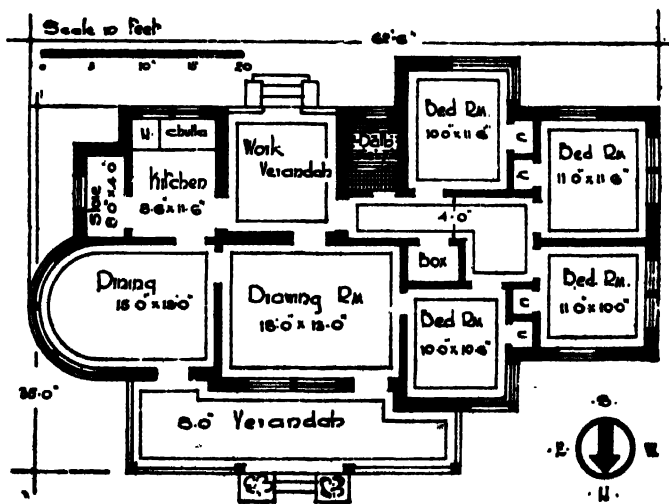


Fig. 127

PLAN NO. 44

PLINTH AREA: 2,091 Sq. Ft.

This is a home of ample dimensions suitable for a richer family. It has two faces, one on the west and the other on the north. There is a small porch on the north front for a car to rest. Next to the porch is an entrance hall, which might serve as a waiting-room for a visitor before he is ushered into the drawing-room. There are two closets denoted by letters "C" for putting cloaks, hats, canes, umbrellas, etc. The spacious drawing hall, with a double window on one side and a bay window on the other, should prove a great attraction. The kitchen, dining-room and store-room are grouped together in an ideal manner in relation to each other. There is a wide verandah on the rear side which would make a very good sleep-out place. There is only one bath-room, but it is large enough and so conveniently located that it is accessible independently from any room of the house. All the three bed-rooms are of a very good size and command the best orientation possible. There are large clothes closets provided in bed-rooms. Another special feature is that every bed-room abuts against a verandah. The provision of the porch makes the northern entrance the formal and main one, leaving the verandah on the west as private to give an informal access to the drawing-room and the two bed-rooms.

Thus, though the home is economically designed, it is on a slightly luxurious scale, suitable for an upper middle class family. As it is designed for an up-country place, where water-carriage system is not available, no sanitary closet is provided inside the building.

From the point of view of construction, there is nothing complicated about it. There is a terraced roof also on the porch, the latter resting on two beams supported by the four pillars. The roof slab on the top of the verandah on the west is partly overhanging and partly supported on the R.C.C. pillars on either side of the steps.

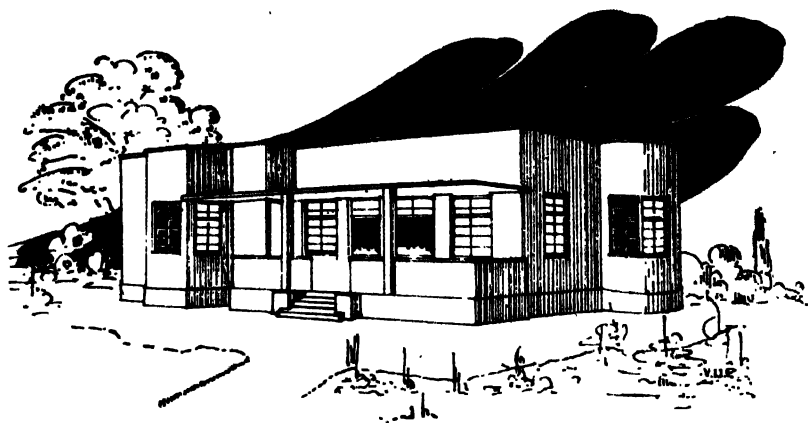


Fig. 128

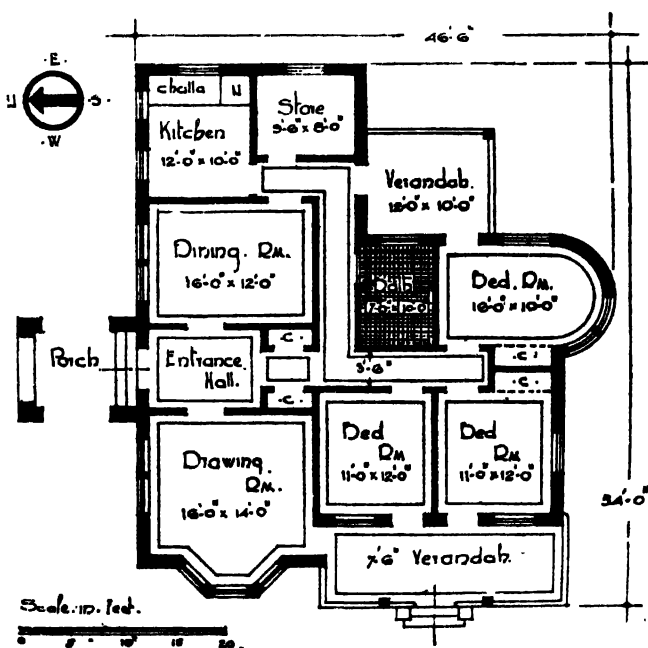


Fig. 129

PLAN NO. 45

PLINTH AREA: 2,054 Sq. Ft.

This plan of an ideal home is specially designed for comfort consistent with economy. It is, in fact, the perfection of a home personified. It is designed for a plot facing north, though N.-E. or N.-W. facings would suit it equally well. It would also suit a corner plot. It is L-shaped and still more compact than the preceding one.

The front circular verandah is in the N.-W. corner and gives access to the spacious drawing-room. The latter, lighted and ventilated by a very wide double window on the north side and protected by the verandah on the west, is sure to remain cool throughout the day and night. The large room behind the drawing-room is in fact a ladies' sitting-room. The kitchen and store have got the right place in the N.-E. corner. The dining-room is a luxury, because it is virtually a glass room. All the bed-rooms are spacious enough and are placed on the west side. Their independence and privacy are maintained by the provision of the corridor. A very spacious bath-room is centrally located so as to serve all the rooms.

The family occupying a home of such dimensions and niceties usually employs a cook, either male or female, and the cook needs a bathing-place to clean himself or herself before cooking is started, and this requirement is met by providing a sink marked N in the store-room. There is a large, paved recreation terrace provided in the back-yard, where all the members of the family can congregate in the evening and listen to the children's story-telling or girls' music. It would also serve as an excellent place for children's play, which, otherwise would over-run the entire house, or for daily outdoor dinner of the family, or for entertaining a large party on festive occasions, like wedding or birthday celebrations. The southernmost bed-room is ventilated on three sides, and, being spacious enough, would prove a veritable paradise for the head of the family, in a secluded corner.

The 12 ft. wide verandah in front would serve as an excellent place for sleeping out of doors amidst the flood of breeze from the S.-W. direction. The height of ceiling of the drawing-room and the ladies' apartment behind it is raised to 14 ft. and clerestory windows provided on the north and south sides. This would further help to make these rooms cool even in the hottest season, because the lower windows may be closed entirely in the morning, as soon as it begins to grow hot, and light and ventilation obtained through the low and wide clerestory windows.

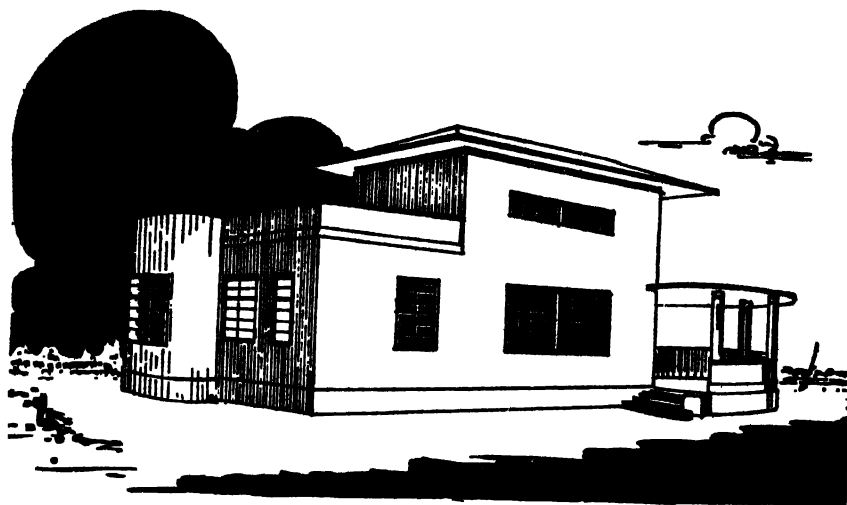


Fig. 130

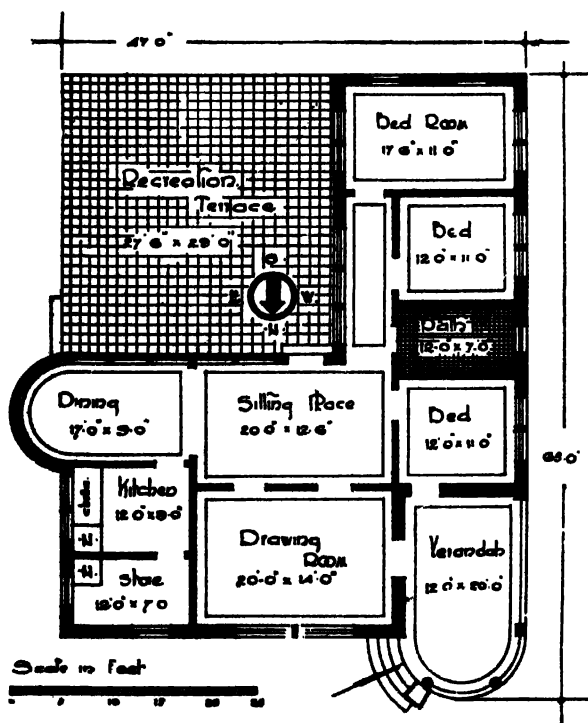


Fig. 131

PLAN NO. 46

PLINTH AREA: 2,063 Sq. Ft.

This cottage possesses perfectly symmetrical arrangements, both inside and outside. It faces the west and covers an area enclosed by about 55 ft. width and 41 ft. depth. It is more suitable for a family living in the European style. There is a portico of elliptical shape 10 ft. deep in front. As the cottage is facing west, this would be very enjoyable the whole day, except in the afternoon and evening, till the sun sinks below the horizon. Behind it is a large room, 18 ft. wide and 27 ft. deep, divided by a cloth curtain into a drawing-room and dining-room. Beyond this is a small verandah to serve mostly as a passage. On both the sides are arranged two bed-rooms in the front and two in the rear, the sizes of which are very good, and between these bed-rooms are placed a bath and w.c., on either side to be used in common by the occupants of both the bed-rooms. The bungalow is built at a place where there are no water carriage and drainage facilities provided. The bath-rooms are, therefore, provided with doors from the outside for the sweeper to come and serve. At such places a small septic tank built on scientific principles serves the purpose best and ends all the troubles, as flushing arrangements can, in that case, be easily made; the purification of sewage takes place automatically inside the septic tank. Still, services of a sweeper are occasionally required for keeping the sanitary wares clean, since, in India ordinary servants, belonging to any class but the sweeper, would not touch them. Hence, an entrance for a sweeper has to be kept.

A small store-room on one side and pantry on the other are symmetrically placed on the rear side. The bed-rooms on the rear side are spread out a little beyond the front sides just to accommodate a window facing the west. Thus the rear bed-rooms also derive the benefit of the western breeze. A staircase from the back verandah is provided to reach the terrace on the top of the house.

The height of the ceiling of the portico is 8 ft.; that of the bed-rooms on either side is 10 ft.; and that of the drawing- and dining-room is 14 ft. In this extra height are kept clerestory windows.

The outer walls are of brick-in-lime plastered on both sides, 14 inches thick: the side walls of the drawing- and dining-rooms are of brick-in-cement mortar, 9 inches thick, and all the remaining ones $4\frac{1}{2}$ inches thick in cement mortar.

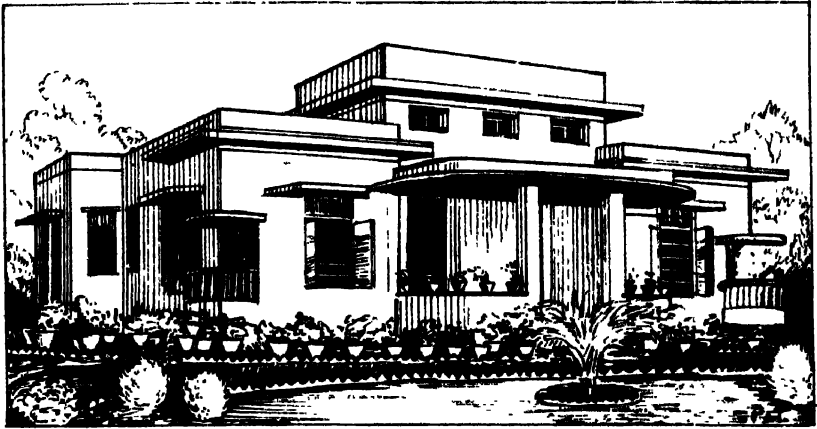


Fig. 132

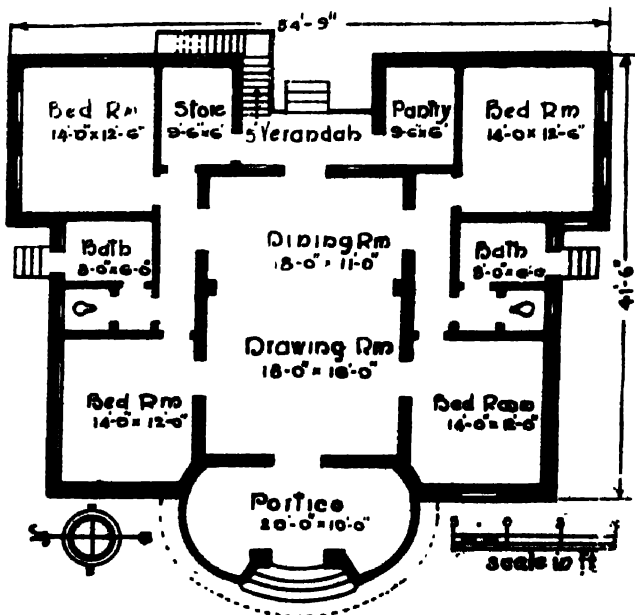


Fig. 133

Architects: K. R. Bhansali & Co., Bombay.

PLAN NO. 47

The house pictured on the opposite page, though on a luxurious scale, is taken from the previous edition, as it is possible to reduce its size and cost considerably as explained below. It was designed for a fastidious family, during pre-War times, who wanted beauty, comfort and conveniences at any cost.

To bring down the cost, reduce the sizes of the rooms, omit the servery and store room, also omit both the $6\frac{1}{2}'$ and $6'$ verandahs, on both sides of the dining room, retaining only the $8'$ verandah, drawing and dining rooms, two bed rooms with attached bath rooms.

The plan is very open, still the privacy of bed rooms is preserved. Secondly, the house can grow as the needs of the family would grow, e.g., build up to the ladies living room in the beginning, and extend bed-rooms behind it later as needed.

An open terrace, behind the dining-room and kitchen upto the last bed-room would give an ideal place for all open air activities, including the play of the tiny tots under the supervision of the ladies in the kitchen and bed-rooms. A railing on the south and the east is required lest children fall down.

The elevation is most attractive. The main walls are of brick in cement $14''$ thick. The outer surface is rendered in snowcem.

A house on such an open, extended plan would be ideal at sea coast, the next best location is in a hilly district like the Deccan. It is not suitable for the plains of N. India, nor on a hill station.

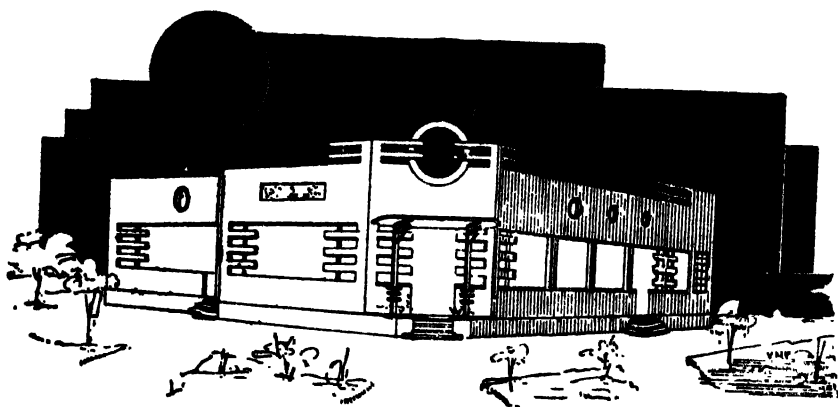


Fig 134

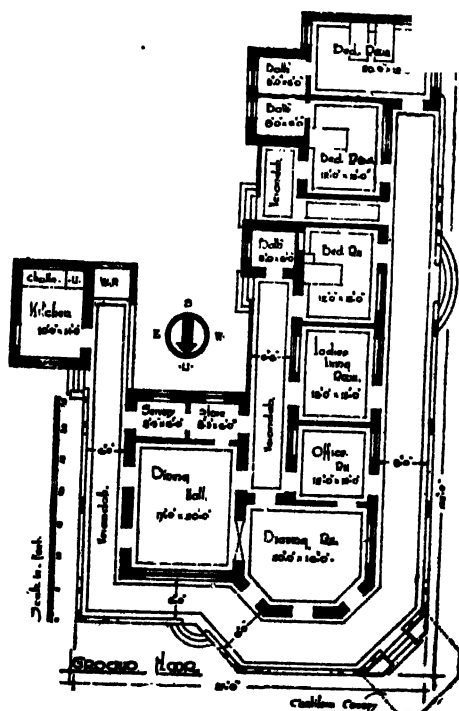


Fig. 135

PLAN NO. 48

BUILT-UP AREA 2583 Sq. Ft.

The bungalow pictured on page 211 is on a rather pretentious scale, designed by the author for Class I officer residing in a suburb of Lahore during pre-partition days. With first class materials and workmanship it cost the owner at that time only Rs. 13,000/-. It faces the North. There are three entrances—the one on the front is for office peons and clerks, the other on the left hand side is the main entrance, and the rear one near the kitchen is for servants. The office room is in a corner, undisturbed. The circulation of the entire house is as best as could be desired. The 10-ft. extensive verandah is most useful for all semi-outdoor activities. The drawing/dining room occupying an area of 28' x 14' is an ideal place for entertainment. Both the bed-rooms are large and of identical sizes. There is a dressing room attached to the master's bed-room. Every bed room has a bath-room attached to it, with outside entrances for sweeper. The kitchen, store and pantry form one unit, which is conveniently placed near the dining-room. There is a hatch window in the pantry for dinner service. The central cross passage allows free movements of servants without disturbing the occupants of any room.

It is possible to build another floor on the top either in part or whole, if a staircase is provided in the verandah just in front of the servants' lobby.

A longitudinal section is given which shows all the minor details about heights and widths of doors and windows, cupboards, height of ceiling, depth of foundation etc.

The walls are plastered with lime on the inside, and the outer-surface is treated with grey snowcem.

The perspective view taken from N. E. corner is also imposing.

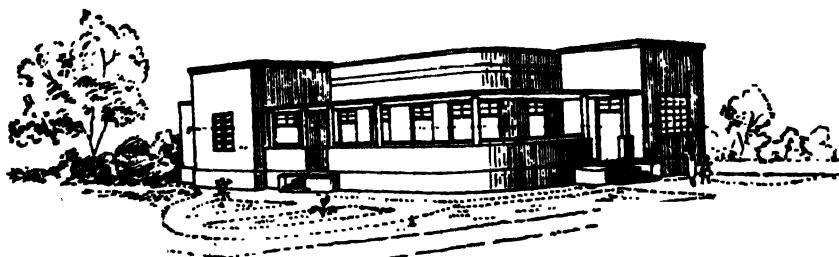


Fig. 136

PERSPECTIVE VIEW FROM N-E CORNER

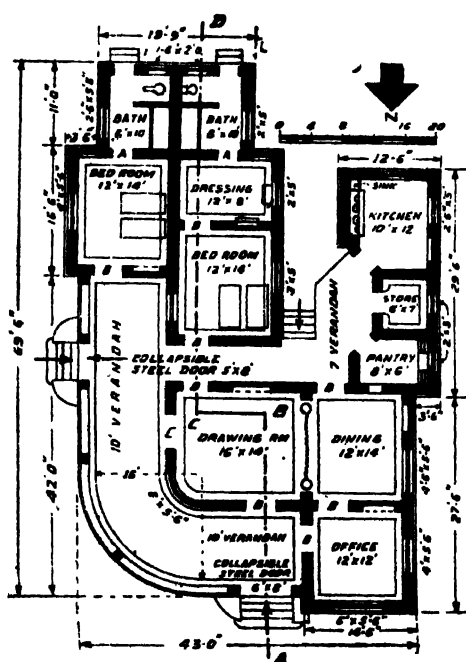


Fig. 137

FLOOR PLAN

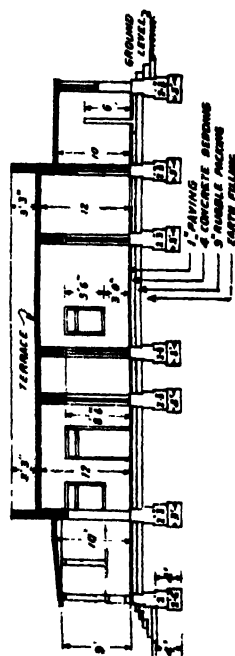


Fig. 138

**CROSS SECTION ON
ABCD**



Fig. 130 ELEVATION

CHAPTER XVIII

STOREYED COTTAGES

PLAN NO. 49

BUILT-UP AREA 816 Sq. Ft.

There is an air of grace and quiet charm about this bungalow. A glance at the plan will show that it is designed with the specific object that it should be pleasant and easy to run. Complete privacy is assured by providing the back wall totally blind, and the side nearly so from the neighbouring houses which are close by. The garage is an integral part of the house, but it is so cleverly arranged that it can be easily converted into a spacious bedroom for which purpose a door is kept for access to the central lobby. When it is used as a garage, the door would be useful for carrying purchases made in the market, directly to the kitchen. The living room provides space for six chairs and a table for dining, slightly screened for privacy by the side-board. The bath-room is centrally located conveniently with respect to the other rooms, and is sufficiently spacious to accommodate a bath tub, commode, lavatory basin and a towel rack. The kitchen is completely modern and also provides space for three seats for informal dinner or tea. The staircase is easy to climb, and is conveniently located with an entrance from the lobby. The large cupboard under the staircase would provide storage for odds and ends, including cleaning equipment such as mops, brushes, brooms, insecticides, etc.

There are three good-sized bed-rooms upstairs with large hanging wardrobes in each. The central common bath-room is of the same size and has the same equipment as the one on the ground floor. The master's bedroom and one other have balconies in their front which are large enough to be used as sleeping porches in the summer. All the pieces of furniture are shown on plan both on the ground and upper floor. The elevation is modern.

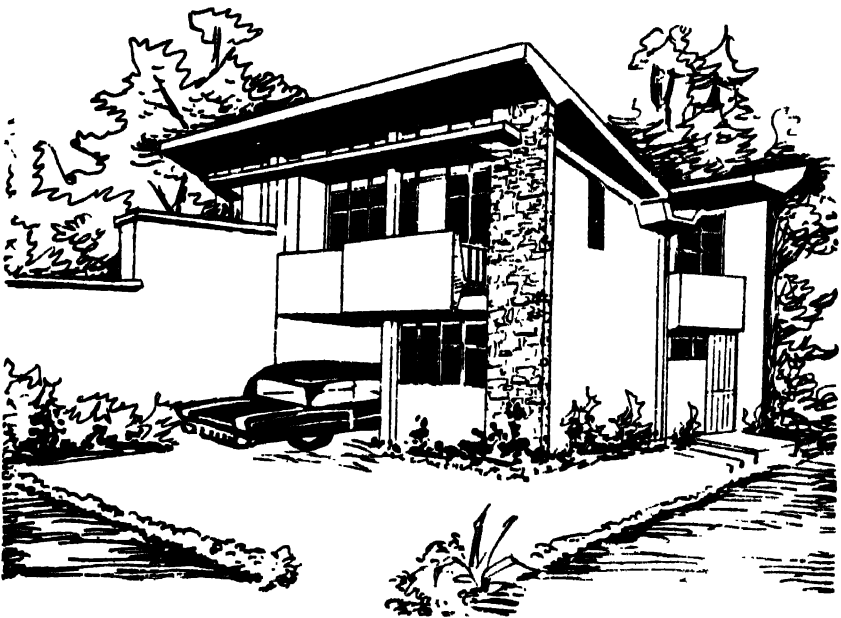
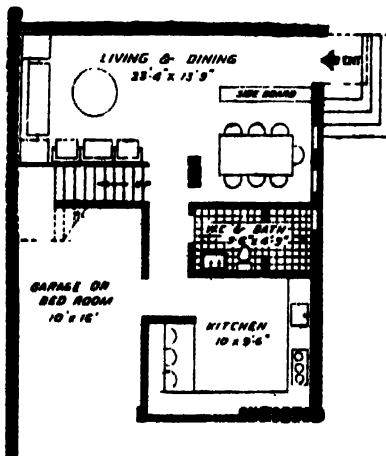
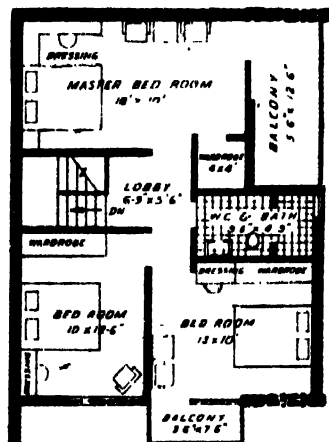


Fig. 141

Fig. 142



GROUND FLOOR PLAN



FIRST FLOOR PLAN

Architects: Bhonsule, Khambatta & Aderi, Bombay

PLAN NO. 50

PLINTH AREA 880 Sq. Ft.

The design of this cosy cottage is sure to appeal to everybody. It is an example of what can be achieved by skilful planning even in a small space and with a small amount of money at one's disposal. It encloses a space less than 900 sq. ft., and yet provides all the amenities of a modern home for a family of six or seven members. It meets all the normal requirements of a middle-class family. A verandah in front and rear, a large drawing-hall, a nice kitchen, a spacious dining-room, and a small store and bath-room on the ground floor, and four nice bed-rooms with a common bath-room on the upper floor, all grouped together in a most compact and convenient manner, certainly must prove a delight to the occupants. The bed-rooms are no doubt small, but what a large, middle-class family needs is the number of the rooms, and not their size, which must necessarily be restricted according to the budget.

Since the bath-room and the kitchen abut against a common wall, it is possible to carry the flue gases by constructing one common chimney, for in the countryside firewood is usually burnt and this causes smoke.

Note that the balcony on the top of the front verandah is not supported by any posts or pillars, but it is entirely anchored inside the wall and made to overhang. The canopy over the balcony does likewise. The central feature, viz., the projecting bay, inside which is located a staircase, has made the cottage look so smart in appearance. The building being square in shape and the roof of flat-terraced type, there is no difficulty in construction. As the cottage is designed for a place where there is no water carriage system of drainage, a w.c. is supposed to be outside the building. If one, however, is to be built, it may be done just outside the cottage adjoining the rear verandah on the right-hand corner.

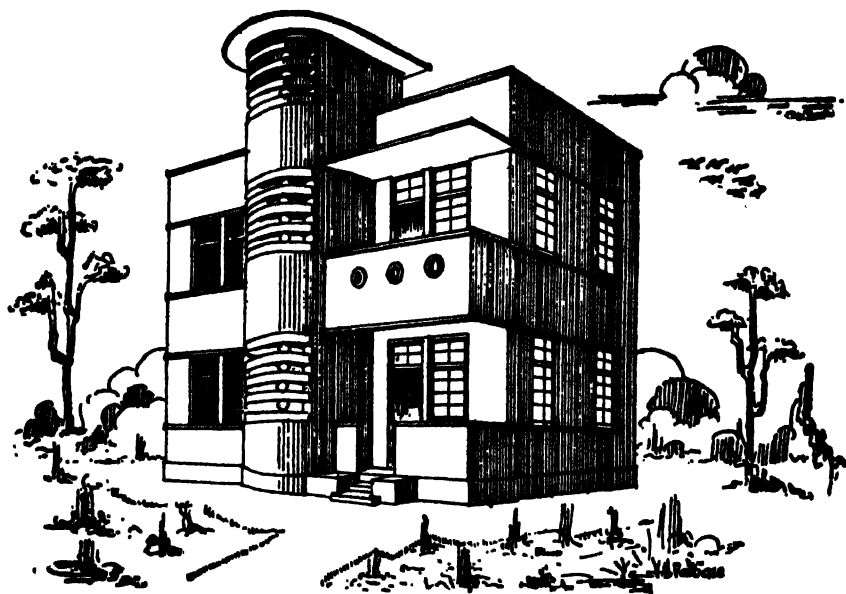
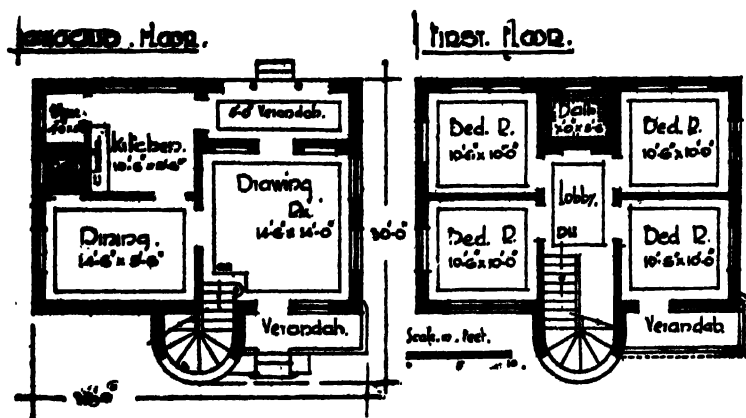


Fig. 143



Figs. 144 & 145

PLAN NO. 51

PLINTH AREA 896 Sq. Ft.

The writer was very much impressed with the beauty and simplicity of this building erected in Wurzburg, Germany. It was designed by Peter Feile and represents one of the three types of cottages built in staggered lines. Considerable changes had to be made on the rear in the original plan so as to make it suit Indian conditions and social customs. This cottage would be most fitting on a riverside, or a sea-face, or in a hill-station commanding an extensive view. The area occupied by the actual building is only 28 ft. by 29 ft. Yet, it provides all the accommodation needed by a fairly large family.

There is an open terrace in front of the main entrance, to which steps are provided on one side. The entrance leads to a drawing-hall on a luxurious scale for a small cottage like this. On the right hand, by the side of the drawing-hall, is a small sitting-room which might serve as a ladies' room or a spare room. The kitchen, dining-room and bath-room are all very conveniently arranged with respect to each other and a store-room is made by enclosing the space below the staircase. There is a side entrance on the right-hand side, near which is placed a w.c. The staircase is located in a convenient corner so that it is easily and independently accessible from every room or from the outside.

On the first floor, there are three single bed-rooms with one common large bath-room. All the bed-rooms face the west, and they are further provided with spacious clothes closets. (The diamond-crossed rectangles indicate these closets.) The terrace in front is paved and would prove an excellent outdoor sitting-room for common use.

On the second floor, there is only one double bed-room with a private bath attached. Provision of a clothes closet has also been made. The bed-room on the second floor recedes a little, leaving an ample paved terrace in the front. There is a large window in the front wall. The sill of it, projecting on the side of the terrace, is made hollow and flower plants are grown in the earth filled in it.

The special feature of the building is the terraces with railing provided on both the upper floors. There is absolutely no ornamentation—not even a cornice in the whole building.

Incidentally, it may be noted that the walls on the upper floors are not supported on similar walls on the lower floor. This can be done both by providing beams below these walls and further by making the walls hollow of light sheets stiffened by timber frames hidden inside the hollows. The method of constructing such walls is explained in the chapter on Insulation or Heat-proofing on page 102.

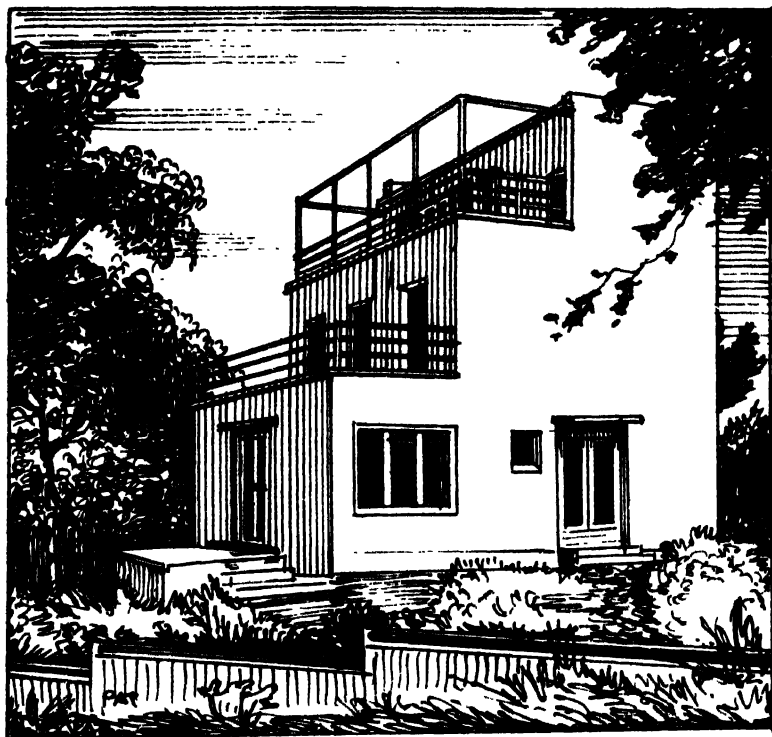


Fig. 146

A cottage in Wurzburg, Germany.
Architect: Peter Feile, Germany.

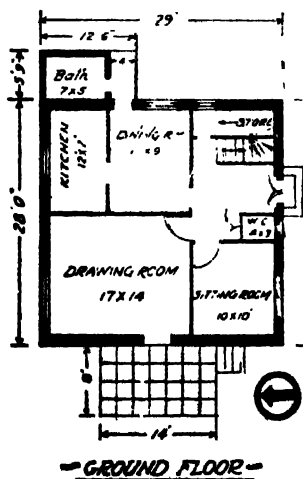


Fig. 147

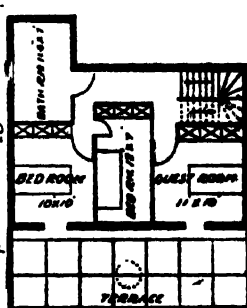


Fig. 148

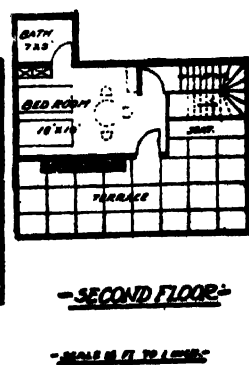


Fig. 149

PLAN NO. 52

PLINTH AREA: 1024 Sq. Ft.

This is another cottage well known in Europe. It was designed by Victor Bourgeois of Belgium and is built in Brussels. Considerable alterations have been made in the plan to suit Indian conditions, though to suit the photograph, the front and the right-hand side of the plan have been kept as in the original.

It occupies, roughly, an area of 32 ft. by 32 ft. only, and still affords as much accommodation as five bed-rooms with a built-in wardrobe in each, kitchen, dining-room, verandah and two bath-rooms, which is indeed a marvellous thing. There is an open terrace in the front which leads to the large drawing-room. A folding partition or a cloth curtain is arranged between the drawing-room and dining-room, where double dotted lines are shown, so that on special occasions either one large drawing-room or one dining-room 30 ft. long and 12 ft. wide can be easily made. The kitchen is spacious enough. The verandah near the kitchen would prove a very good utility room. The staircase is 3' 6" wide and has an easy climb. The bath-room is in a convenient place within easy access of any room, and a w.c. is located below the landing of the staircase. In fact, it is a toilet-room with a wash-hand basin in a corner.

Upstairs, there are five bed-rooms with an independent approach to each. Two of them can accommodate double beds. Positions of beds have been shown on the plan. Clothes closets have been provided, one in each bed-room. There is a bath-room on top of the one on the ground floor. A small balcony is provided to which access from one bed-room is shown in the plan, but it can be provided also from another bed-room by substituting a door for the window.

In the original plan, there is a small basement floor provided below the dining-room and the kitchen, a window of which is seen on the right-hand side. But for Indian conditions, there would be no necessity for it.

The elevation looks beautiful for its very plainness and simplicity. All the outer walls and one central wall are 14 inches thick of brick-in-lime, the remaining ones, 4½ inches thick. It is possible to provide two or three wall-cupboards in the central thick wall, though they are not shown in the plan. There is not the slightest doubt that the cottage would prove an ideal home for a large, middle-class family.

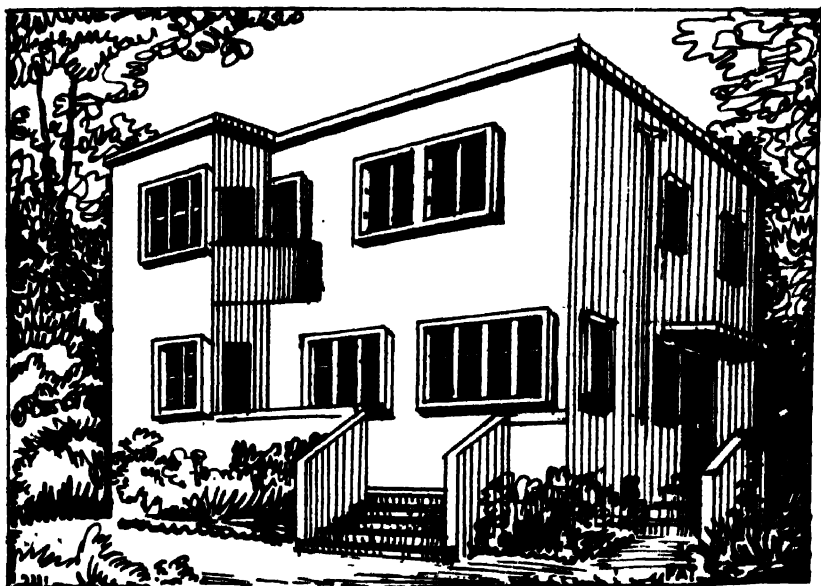


Fig. 150

A cottage in Brussels.
Architect: Victor Bourgeois, Belgium.

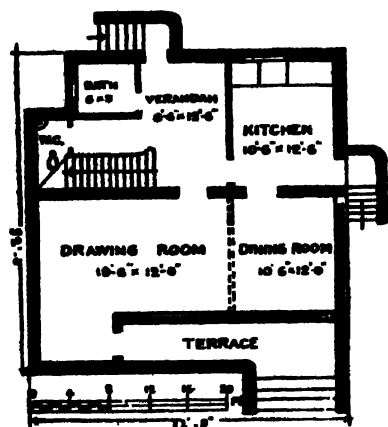


Fig. 151

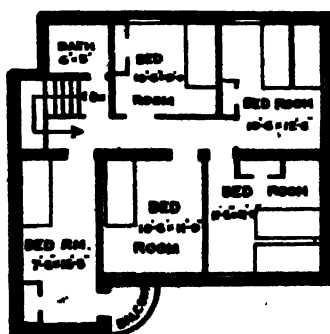


Fig. 152

PLAN NO. 53

PLINTH AREA: 1083 Sq. Ft.

This is a famous cottage designed by Bruno Taut and built at Stuttgart, Germany. The isometric elevation is original, but alterations have been made in the plan to suit Indian conditions and social customs, though the front and the right-hand side of the plan are retained as in the original to suit the elevation. The orientation has also been changed. It is built to face the east at Stuttgart, but for Indian conditions, it would be suitable for the south or south-east.

The design is replete with several useful features and possesses a charm in simplicity that is at once inspiring. There is a small verandah in front, just to serve as a waiting-place, before a visitor who announces his arrival is admitted into the drawing-room. For Indian social customs, a door from the verandah opening into the drawing-room would be necessary, but as I wanted to retain the original elevation to show its grace, no changes were allowed. The drawing-hall, which is sufficiently large for a small cottage like this, is further increased in size by combining the dining-room with it by a cloth curtain. Thus both the drawing- and dining-hall would function to the maximum extent. There are three bed-rooms—two on the ground floor and a large one on the upper floor. Both the bed-rooms on the ground floor are provided with clothes closets. The rectangles with diagonals crossing each other shown in bed-rooms are the closets. The bath-room is spacious enough and is very conveniently situated. The staircase occupies an ideal position accessible from any room leading either to the upper bed-room or terrace. The kitchen occupies the most suitable position, viz., N.-E. corner. There is a small verandah through which an exit is provided at the back. The w.c. is just outside, but adjoining the house. There is a smoke-outlet provided which serves also as a fire-place and chimney. The design, as it is, would be very suitable in a hill station in this country. If it is to be adopted on the plains, the chulla range with its smoke-outlet may be installed in the N.E. corner of the kitchen. Thus, in a space of 31 ft. x 33 ft. all the elements of comfort and convenience for a family of 6 or 7 members are provided. There are no curves and no projecting balconies. Although the plan is a simple square with square corners, the elevation is very attractive.

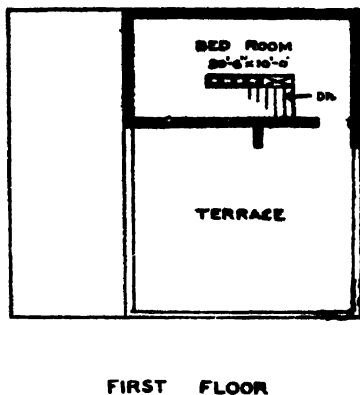
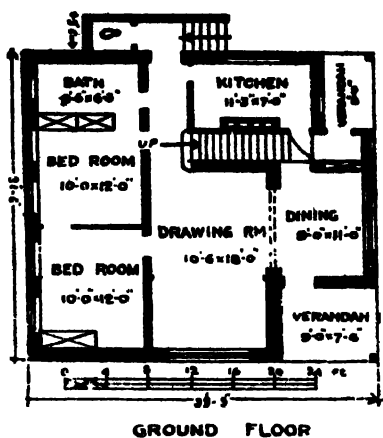


Fig. 153 & 154

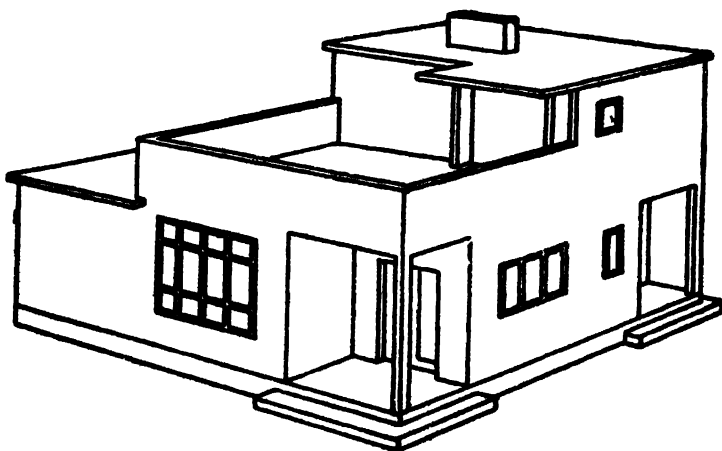


Fig. 155

Architect: Bruno Taut, Germany.

PLAN NO. 54

AREA OF TWO STOREYS: 1052 Sq. Ft.

The gardened home pictured on the opposite page combines economy and the sentimental appeal of the small house with the comforts and conveniences of the larger. Both in appearance and in interior accommodation it avoids the crampedness which is usually experienced in the average small home.

At the entrance there is a conservatory of evergreen fresh plants of variegated colours, which is most inviting. The four feet passage runs straight and on its right-hand side just at the entrance is the good-sized drawing-room. The bed-room on the left-hand side, with five windows in its wide sweeping segmental front side, and a spacious concrete flower box in front is most pleasing, and with the large bath-room attached to it would serve as a veritable comfort room. Beyond the bath-room is a small study-room in a corner away from the hubbub of the rest of the house. The general bath-room, kitchen, store and the dining-room are all very conveniently grouped together. The store-room is rather narrow, but with rows of shelves it would hold a large stock. It is lighted by a small window. Besides, the space below the staircase could be utilised for storage. The central passage affords the best circulation throughout.

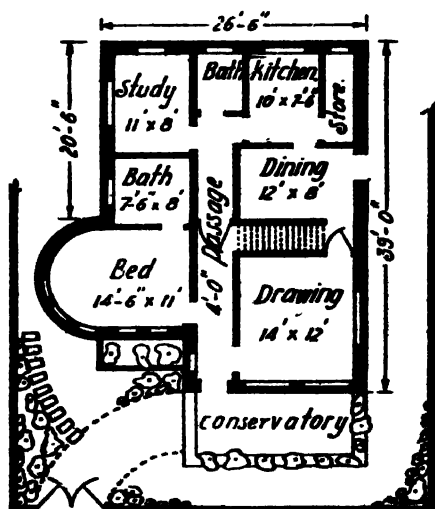
Upstairs there are two bed-rooms with their own bath-rooms. The large terrace in the front adds both to the beauty and comfort.

The exterior is simple and unassuming. The tiled roof in the background, the flat terrace in the front, the projecting long canopy over and the flower boxes below the windows, and the conservatory of fresh plants on both the floors, all combine to give it a charm and distinction which are sure to appeal to everybody.

The plan is suitable for even a narrow plot, say, with a frontage of only 50 ft.

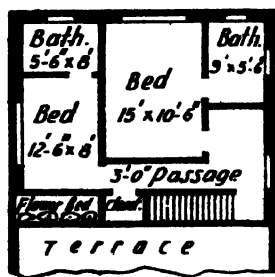


Fig. 156



Ground Floor Plan.

Fig. 157



First Floor Plan.

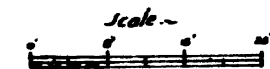


Fig. 158

PLAN NO. 55

PLINTH AREA: 1008 Sq. Ft.

This is one of the simplest and most convenient buildings. The main building itself covers an area of 36 ft. by 28 ft. only. In front of the entrance is a verandah in the form of a staircase hall 12 ft. deep. On the right-hand side of it is a long and narrow drawing-room and behind the staircase hall is a good sized, almost square room for dining. But all these three rooms are connected by folding partitions in such a way that when necessary, they can all combine and form a large hall of 24 ft. by 25 ft. Such folding partitions may be either of wood or patent composition sheets, of which there is a large variety in the market. They are in the form of panels hinged together so that they can be folded like a pack of cards. Sometimes, mechanical gears are employed for opening or closing them. The kitchen, store-room and bath-room are all conveniently arranged on the left-hand side. Beyond the kitchen is a well-lighted and ventilated paved room to serve as a day nursery and play-room for children, under the direct supervision of the mother working in the kitchen. There is a paved terrace provided on the back and right-hand side of the drawing-room, shaded by a group of trees. On the front side, near the drawing-room, a high compound wall is constructed and a bower is made on which creepers are trailed as shown in the elevation. This would prove an excellent place for out-door dining or sitting at ease in the cool breeze.

Upstairs, there is a large room for the master with double bed and a balcony on the west side. The wall on the side of the balcony is also folding, so that it could be opened and the full breeze admitted inside. There is a private bath for the master's room. Next to the master's room is a girls' room, and next to it, a boys' room. Both these have access to the open terrace on the rear side on the west. There are two closets and a bath-room common for the two rooms.

The elevation is devoid of ornamentation and is conspicuous by its simplicity. The construction is quite simple. There are no projections nor recesses in the plan.

An eastern or north-eastern aspect is suitable for the building.

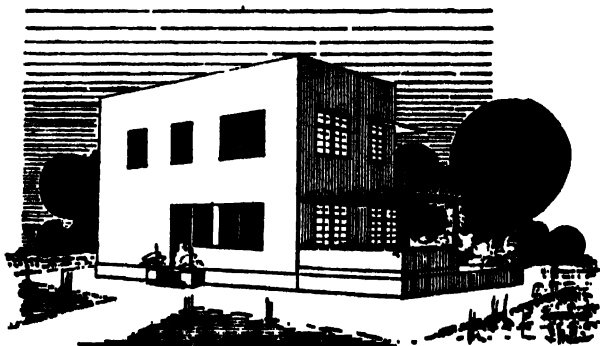


Fig. 159

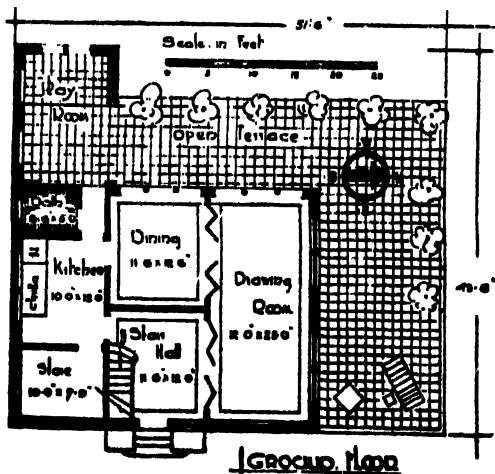


Fig. 160

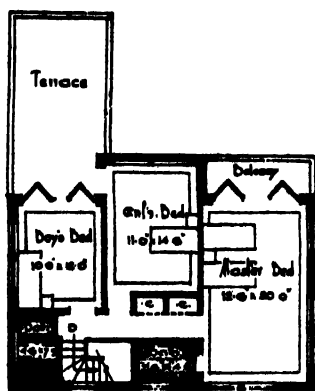


Fig. 161

PLAN NO. 56

PLINTH AREA 1088 Sq. Ft.

The nearer the cube in shape, the less costly a building is sure to be. The plan of this building and that of the previous one are based on this principle. It measures, roughly, 35 ft. by 35 ft. The staircase hall serves as an axis, dividing the ground floor area into two parts: one, service centre, comprising a kitchen, store-room, dining-room, a bath-room and w. c., and the other, on the right-hand side, of rest and recreation. The sizes of all the rooms in the service wing are really very good and their grouping also is excellent. The open terrace at the back would be very useful, firstly, as an out-door dining-room; secondly, for children at play; thirdly, for rest and relaxation in the open air amidst the little family circle, forgetting the worries of the day; fourthly, for any social function for which the drawing-hall, which, though spacious enough, would be found too small. When the folding partition on the rear side of the drawing-hall is opened, the open terrace becomes part of the large drawing-hall. The 7' 6" wide verandah would amply meet all the requirements expected of it. The staircase is wide enough and has an easy climb, with only one flat landing in the full length.

Upstairs, there are four bed-rooms of excellent size for such a cottage of medium size, with a spacious bath-room, very conveniently situated. There is a balcony on the rear side, through which there is an approach to the terrace. The largest bed-room is of 12' \times 15' size and would be very convenient for the master of the house to occupy. Clothes closets have not been shown, but there is ample space for them in every room.

Perhaps it is likely that provision for too many windows might cause a glare which is detrimental to rest. Either the number of windows may be reduced, which would also reduce the cost, or blinds may be provided to cover part or the whole of the window surface, as and when necessary.

For such a plan, with bed-rooms on all four sides, it is difficult to prescribe the proper orientation. But, in the present case, a north facing would be very suitable. In that case, the kitchen would be in the north-east direction and, in that position, all the smoke and smell from that room would go away from the house.

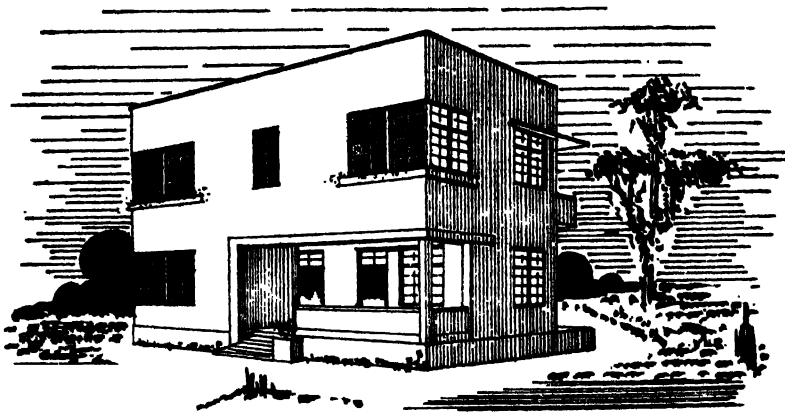


Fig. 162

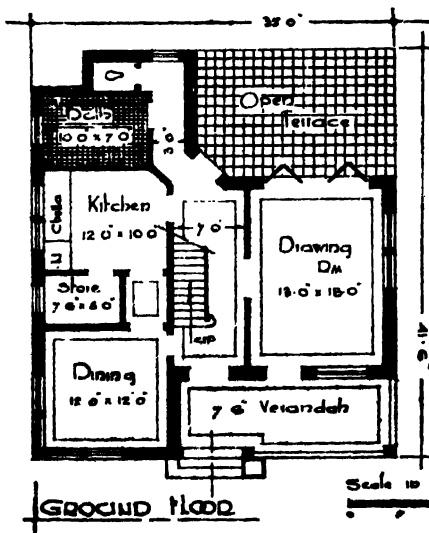


Fig. 163

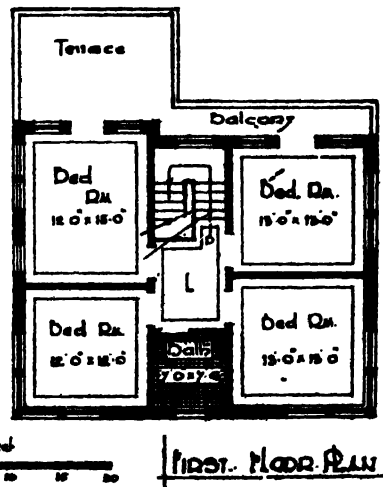


Fig. 164

PLAN NO. 57

PLINTH AREA 1107 Sq. Ft.

This is a plan of a small, compact house designed by Mr. Bodhani. Simplicity, straightforwardness and economical use of space are the key-notes of the design.

The entrance vestibule has provided two sofa seats for strangers to wait, until they are ushered into the living room. The latter is spacious. Adjoining it on the left is a kitchen-cum-dining room of adequate size, and facing the latter is a good-sized bed-room with a built-in wardrobe. The latter would prove an excellent "comfort" room as it contains all the essentials.

The special feature of this plan is the car-port. A garage as an integral part of a house is very convenient and economical. In the present case economy is achieved by the architect by enclosing it by walls on only two sides and expanded metal screen on the third. Further economy is effected by extending the ceiling slab by projecting the overhang in front a few feet. As a garage must be at ground level and as it does not require more than 7 ft. height of ceiling, economy is effected by building a bed-room on its top and providing an entrance to it from the middle landing of the dog-legged staircase behind it. This bed-room would have been very long and narrow. To avoid this the architect has skilfully converted the projecting part of the garage roof below into a spacious balcony-cum-covered-verandah. The bath-room, w.c., and the front bed-room on the upper floor are just on the top of the same rooms on the ground floor. Close to the bath-rooms on both floors, lavatory basins are conveniently installed in the narrow spaces. The spacious terrace on the upper floor is a veritable blessing. For, excepting in the rainy season it can be used as an open-air dining, sitting or sleeping room as private as any indoor room.

The stepped front of the house creates an illusion that the building is large. The tall slit windows of front bed-rooms, projecting gallery on top of the car-port, slits in the parapets, etc. all combined, present a snug, warm, and inviting appearance.

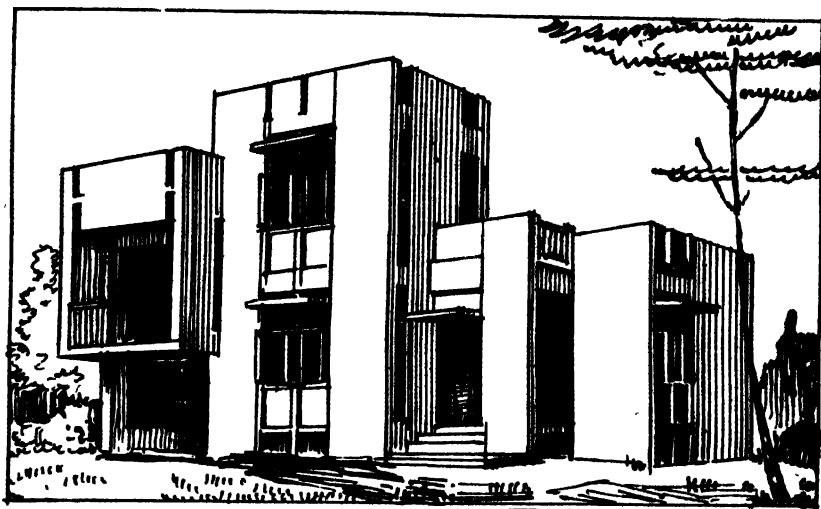


Fig. 165

Fig. 166

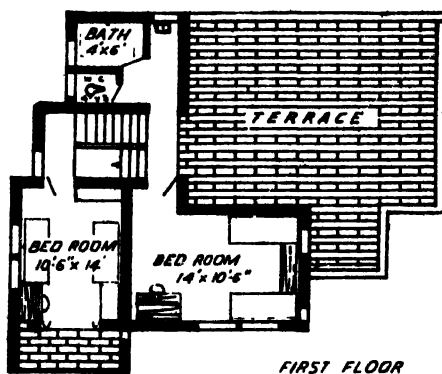
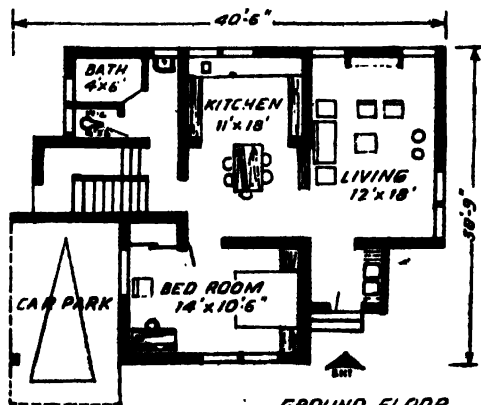


Fig. 167



Architect: R. S. Bodhani, Poona.

PLAN NO. 58

PLINTH AREA 1160 Sq. Ft.

This plan has the main entrance on the east side, although the elevation is from the south-west corner. It is slightly L-shaped, with the short leg of the L comprising the service wing and the other, the living wing. At the entrance, there is a verandah 7 ft. wide, which leads to the dining-room in front and the drawing-room on one side. The latter occupies the full depth of the cottage, and thus commands light and ventilation from three sides. In fact, the entire cottage may be said to be one room deep, and it possesses the best ventilating and lighting facilities. The dining-room is very spacious. The staircase occupies a most central and convenient position, so that it can be independently reached from any room. It consists of two straight flights of steps joined by a semi-circle and, as such, it is more artistic, but from the point of view of convenience, two straight flights joined by a straight, flat landing, without any winding steps, are always to be preferred. (Vide page 59.) The kitchen is spacious and the large dining-room is very conveniently placed with respect to it. The general bath-room, though sufficient in size and easily accessible, is placed between the store-room and the kitchen, which some families may not like. If the store-room is close to the kitchen, it saves the lady unnecessary trips to and fro. The store-room itself is sufficiently large and has, again, another small room for storing fuel, such as firewood, charcoal, or coke. The w.c. is at one end of the passage. The drawing-room is L-shaped, the shorter leg of which may be useful as a small vestibule or a verandah.

Upstairs, there is an open terrace on the top of the kitchen, and there are three bed-rooms, a verandah and two bath-rooms. The alternative of having a bed-room on the top of the kitchen, a bath-room on top of the lower bath-room and a terrace on the top of the store-room, fuel-room and part of the verandah, would be better. Because, in that case, all the bed-rooms would be in a straight line and the benefit of the terrace would be derived by all of them, instead of by only two as at present. The bath-room also in that case would be independently accessible and could be used in common by the occupants of the two smaller bed-rooms, leaving the one behind the staircase for the exclusive use of the master occupying the larger bed-room. The building has only one projection and all corners are square. There is absolutely no space wasted. The orientation shown would be even better for the alternative plan of the upper floor suggested above.

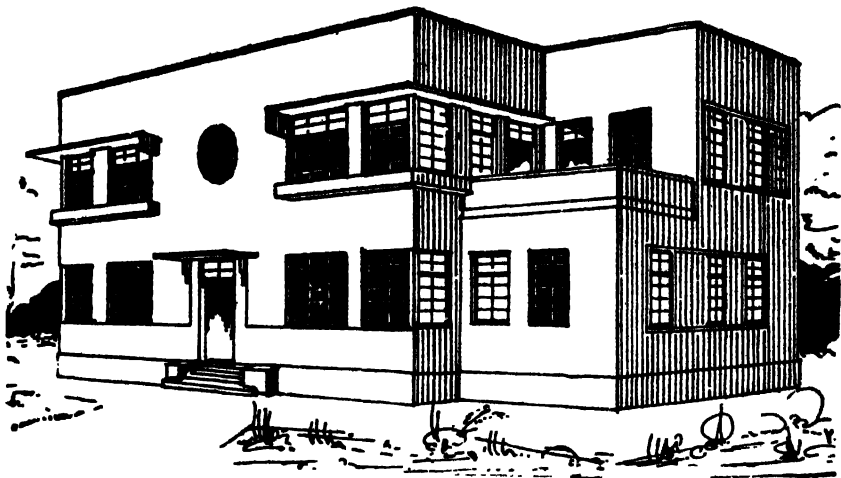
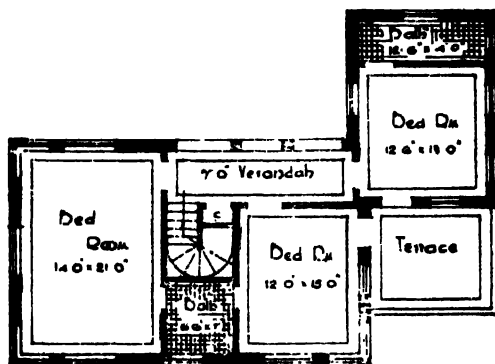


Fig. 168

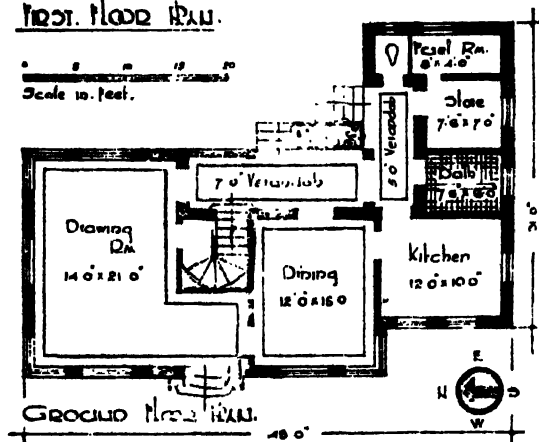
Fig. 169



FIRST FLOOR PLAN.

Scale 1/8" = 1'-0"

Fig. 170



GROUND FLOOR PLAN.

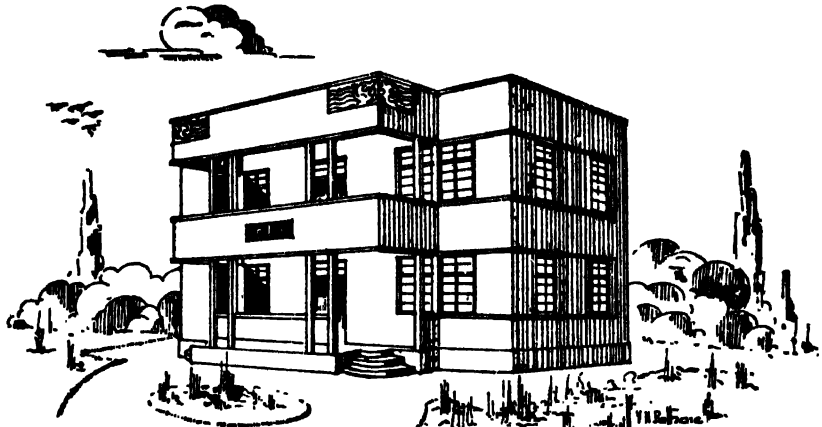
PLAN NO. 59

PLINTH AREA 1185 Sq. Ft.

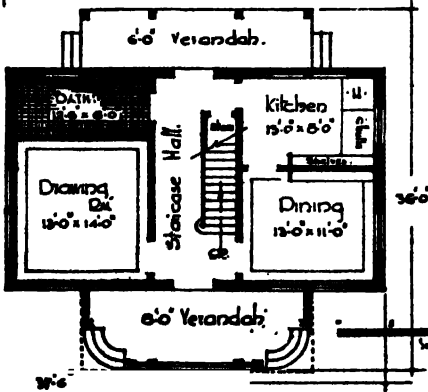
This is an excellent cubical home on a square plan, occupying roughly $37' \times 36'$. It contains all that is required for a large middle-class family with moderate means. The style is the simplest possible; still, the elevation is very attractive and the interior arrangements fully synchronise with the outside beauty. There is a verandah 8 ft. wide to serve as the main sitting-out place, though there is a separate drawing-room for use on formal occasions. There are two corner entrances, which are rounded for artistic effect. The arrangement of rooms inside, with the drawing-room on one side and the kitchen and dining-room on the other, is very simple and efficient. The drawing-hall might perhaps be deemed small, particularly as it is nearly a square room. The staircase is in one straight flight, very centrally and conveniently arranged. The space below the staircase is enclosed and turned into a store-room as there is no separate store-room. Both the kitchen and dining-room are large enough. The bath-room behind the drawing-room is very large, perhaps disproportionately large, for the typical cottage. But a large bath-room is often an advantage. There is a 6 ft. verandah on the rear side, which would be very useful not only for certain activities outside the kitchen, but also for sitting at ease.

The arrangement upstairs is very good with a bath-room centrally placed for common use and four bed-rooms, one in each corner. The bed-rooms are rather small, but a large middle-class family requires rather more small rooms than fewer large ones. Again, as they are oblong in size, they would be more serviceable. Another special arrangement is that every room gets the benefit of the verandah, the front bed-rooms of the front verandah, and the rear rooms of the rear one. As the verandahs are sufficiently wide, they can be used both as balconies and also as sleeping-out places on hot, sultry nights. As the corners of the front verandah on the ground floor are rounded, and those of the upper, made square, the latter have to overhang a little. But it is inexpensive and also adds to the artistic beauty.

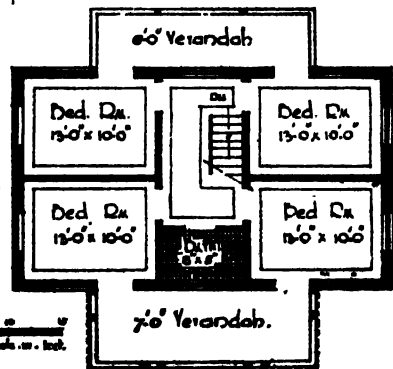
The same staircase can be continued to reach the terrace roof. Concrete jalies (latticed slabs) are provided in the corner of the parapet walls.



GROUND. FLOOR.



1ST. FLOOR.



Figs. 171, 172 & 173

PLAN NO. 60

PLINTH AREA 1245 Sq. Ft.

This is an excellent, compact plan of a medium-sized cottage, in which every single inch of built-up space has been usefully utilised.

There are several special features worth noting, for instance, the garage forms part of the building. This is advantageous in several ways: Firstly it is economical in construction as it saves at least one wall. Again, the area to be roofed over is smaller than if it were built as an isolated structure. Secondly, it saves several footsteps in order to reach the garage, which is very important when it is raining. Thirdly, if a flat roof is provided over it, it could be utilised as a terrace, and so on. The wide corner windows on both the floors, besides serving as excellent means of light and ventilation, have contributed to the charm of the exterior. The horizontal lines of the flat roofs over different rooms are so arranged at different heights that there is an effect of terracing. This is markedly apparent in Fig. 175 in which even the top line of the compound wall forms the lowermost terrace.

The accommodation consists of a spacious drawing-hall, a dining-room, a good sized kitchen and bed-room, a bath-room in a corner, and a w. c. under the landing of the staircase. There are three bed-rooms on the upper floor and a toilet-room. Two of the bed-rooms are small—of a size just to meet the requirements of the Bombay Municipality which allows the minimum size of a room to be not less than 100 sq. ft. Really speaking, the means provided for continually changing the air in the room rather than its size is of importance. The large terrace in the front provides an excellent space for many out-door activities of the family.

If the blind partition between drawing and dining rooms is replaced by a folding or removable framed screen both the rooms can be combined into a spacious one for use on special occasions.

Fig. 175 shows another beautiful elevation which is altogether different from the other. This shows that the planning of a house for comfort and convenience is the most important thing, and if it is good, a skilful architect can give it any desired effect in elevation.

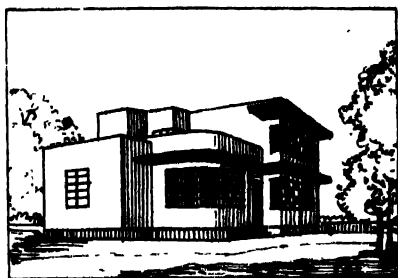


Fig 174

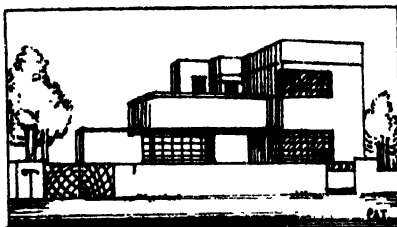
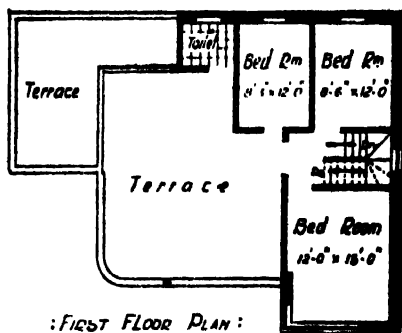
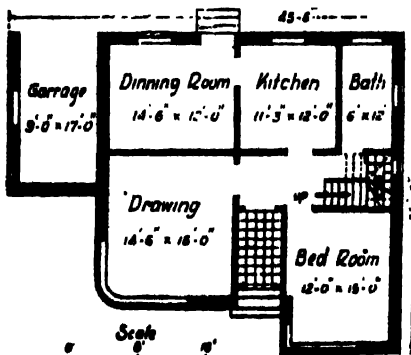


Fig 175



:FIRST FLOOR PLAN:

Fig 176



:GROUND FLOOR PLAN:

Fig. 177

PLAN NO. 61

PLINTH AREA 1260 Sq. Ft.

The writer was impressed with this cottage built at Zurich, Switzerland. It is extremely simple both in design and in construction—quite a rectangular plan without a single curve, recess or projection. Such buildings necessarily cost less both in initial construction and annual maintenance and, yet, provide no less comfort than buildings with ornamental features.

The house covers an area of about 1,300 sq. ft. of ground and has a frontage of 44 ft. The main entrance is on the right-hand side into a verandah 8 ft. wide. The special feature of this verandah is that there is not a single post or pillar, the two sides of its roof are anchored into the walls, the other two sides being left overhanging. The ceiling light is in a recess inside. On the left-hand side of the verandah is a spacious drawing-hall with a very wide window. The dotted lines in the drawing-room and library show window seats. The large room allotted to the library is in a secluded corner away from the hubbub of the rest of the house. This room would serve also as a "comfort room" since, in the north-west corner, it will remain cool and also command a western breeze.

The apartments in the row behind are devoted to the service side of the home. The right corner is occupied by a spacious dining-room, next to it comes a room of adequate size for the kitchen, then follow the store-room, bath-room, and the back entrance, all located at the most convenient places. The w. c., is placed below the landing of the staircase. The latter is so placed that it is approachable from any room of the house without disturbing the privacy of the others. It has four straight flights without a single winding step.

Upstairs, there are five bed-rooms, two terraced balconies, one bath-room and one w.c. Two bed-rooms are pretty large, with a common large terrace in front. The short passage midway, secures the privacy of each bed-room. Thus, if the library on the ground floor is reckoned as a bed-room, the small cottage provides six bed-rooms of adequate size.

Unlike other plans, the central longitudinal wall on the ground floor is 15 inches thick in which a number of wall-cupboards can be provided.

Numerous alterations have been made in the original plan to suit Indian conditions, though to suit the photograph the front and the right-hand side have been left as they originally were.

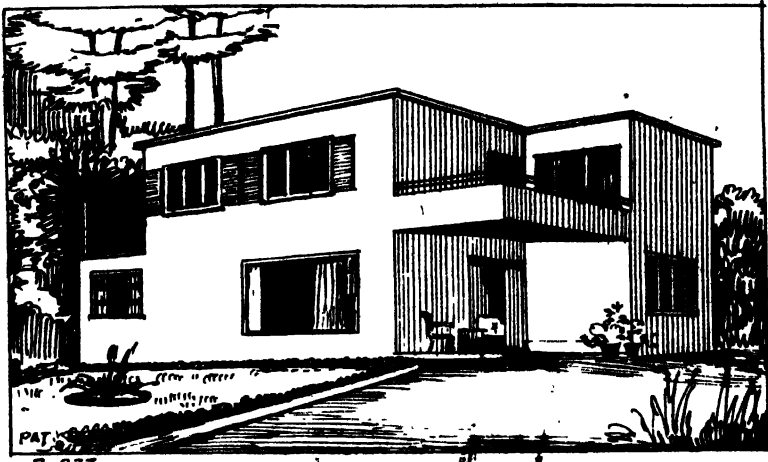
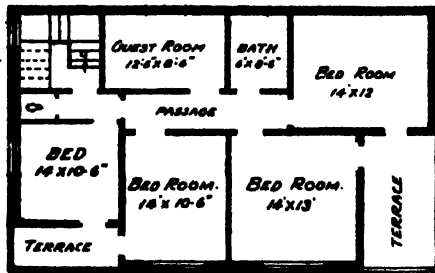


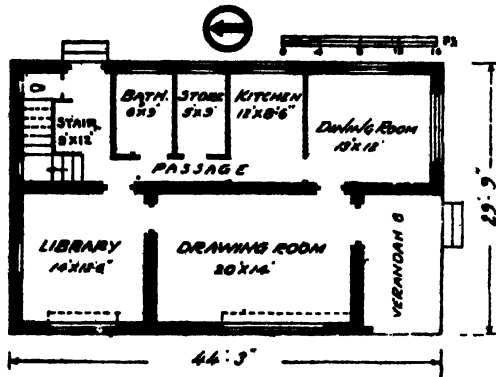
Fig. 178

Fig. 180



— FIRST FLOOR —

Fig. 179



— GROUND FLOOR —

PLAN NO. 62

BUILT-UP AREA 1332 Sq. Ft.

This is a compact, modern building, skilfully designed, square in plan. The entrance is from the left hand side, which leads through a lobby to the ground floor and also to the staircase. The accommodation on the ground floor consists of a large living-cum-dining room, the dining space being separated by a curtain. In the living room there is a considerable unbroken wall space, and many different arrangements of furniture than the one shown are possible. The good sized kitchen is very well placed between the dining space on one side and a spacious store room with rows of shelves on the other. In the left-hand corner is a spacious bed-room with an attached private bath-room. These conveniences and the proximity of the kitchen make it an ideal "comfort" room.

Upstairs there are two luxurious, spacious bed-rooms with attached bath-rooms and a very spacious terrace, which is extended both in width and length by cantilevering or projecting it in the front as well as on sides. No space is wasted. That occupied by the passages on both floors is the minimum.

The exterior is most charming and attractive. The narrow windows on both the sides of the front on both the floors carried to ceiling and joined at the top by a strip window, and the entire space between them filled with a facade of random rubble masonry has lent a special charm to the building. A portion of the flat roof on the left hand is sloping.

An altogether very compact, comfortable, and beautiful house which is sure to be the pride of the family.

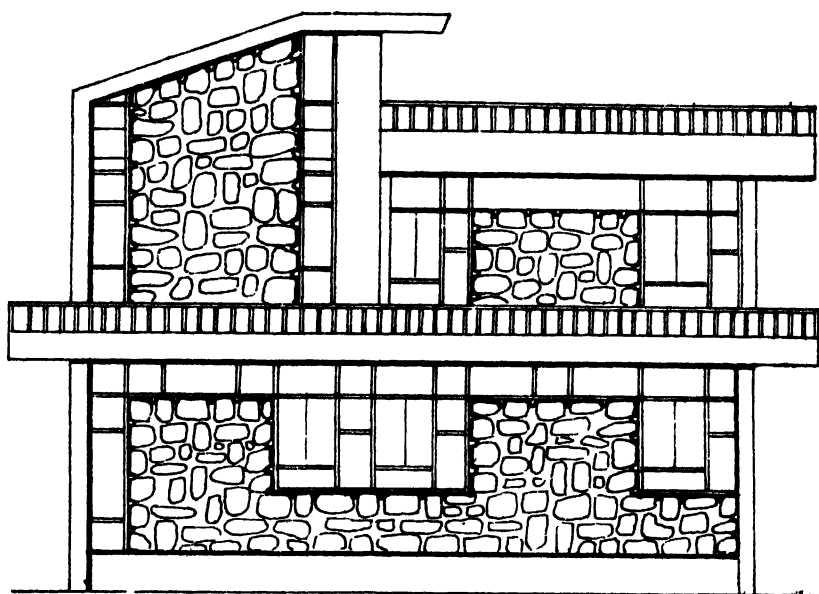
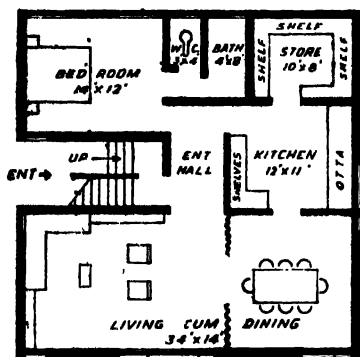
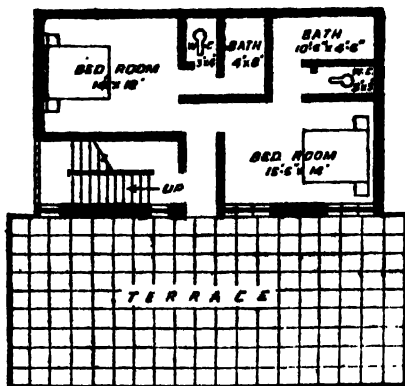


Fig. 181



GROUND FLOOR PLAN



FIRST FLOOR PLAN

Fig. 182 & 183

Architects: Bhonsule, Khambatta & Aederi, Bombay

PLAN NO. 63

PLINTH AREA 1345 Sq. Ft.

This is a luxurious cottage on an American model for a small family. At the entrance is a verandah, in which an attractive staircase is placed just opposite to the main entrance. A front staircase, if properly designed, is capable of becoming a central feature in a building. The verandah, or rather the staircase hall, is itself sufficiently large either to serve as a sitting-out place or a waiting-room for visitors. On the right-hand side is a spacious drawing-room with a six-foot verandah behind. The partition between the drawing-room and the verandah can be opened out by folding the panels so that a spacious drawing-hall of 20 ft. square, can be easily made. There is, further, an open terrace 10 ft. deep, which ultimately makes the drawing-room 20'×30', for use on festive occasions. On the left-hand side, the kitchen is sufficiently large to serve also the purpose of dining and, if need be, the open terrace may be used for out-door dining. It is thus possible to make the dining-room serve as a "comfort room" (vide page 60), as it has the further advantage of having the bath-room attached to it. The store-room is very conveniently placed and allows, by its side, a back entrance to the kitchen. The open terrace would be an ideal place for children to play, under the direct supervision of the mother working in the kitchen, who can easily keep an eye on their activities.

Upstairs, there are three bed-rooms. The larger one would be a veritable paradise for the master, with an independent bath-room and spacious balcony on the west side, which, with the help of curtains, can be used as a dressing-room also. There is a bed-room for boys and another for girls, with a large bath-room for common use and a spacious terrace on the west side, also for common use. The lobby is spacious enough to serve as an upper staircase hall and there are cupboards in it on both sides of the window. A seat in the window would command an excellent view of the landscape. The lobby can be used for a game of cards or of carroms.

The positions of beds are shown on the plan.

The elevation is quite plain and absolutely devoid of ornamentation yet very enticing. Thus the cottage is in every respect *de facto* one of the ideal homes, satisfying all the requirements.

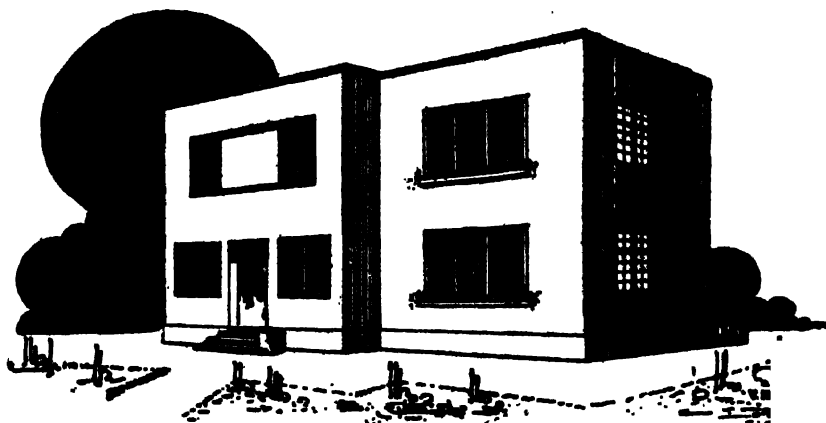


Fig. 184

Fig. 185

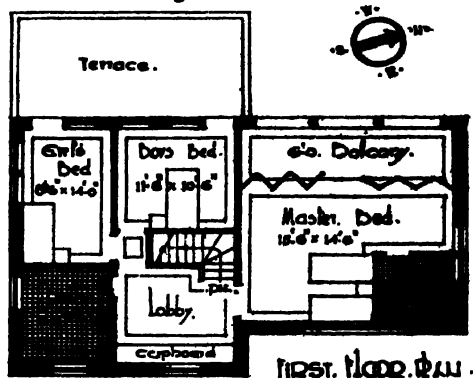
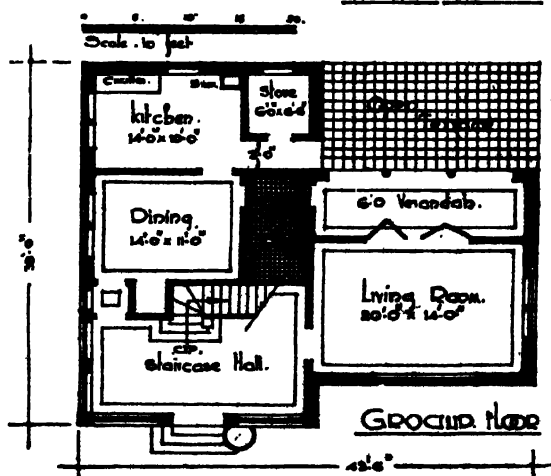


Fig. 186



PLAN NO. 64

BUILT-UP AREA 1405 Sq. Ft.

Figs. 188, 189 represent a plan of a very charming house with a beautiful exterior, with which the interior arrangements also fully synchronise.

The main entrance is from the right hand side, which leads to both the verandah on the left and the staircase on the right. The 9' 8" verandah is a very luxurious place for sitting out at ease enjoying breeze, and as the entrance to it is just on one side, its space could be fully utilised. There is a spacious room of 25' x 13' for living/dining with an open paved terrace on the rear side, which is another luxury both for out-door dining or sleeping in summer. A folding partition or a screen will divide the apparently long and narrow room into dining and living rooms of good proportions. In the left hand wing there is a kitchen on the rear, close to the dining-room with a door opening into the terrace. The bed-room in the front is equipped with a built-in closet, and has an exit door on the left. The bath-room and w.c. are very conveniently located between the kitchen and the bed-room, with a small lobby in front. Behind the staircase there is a spacious bed-room with its private bath-room, equipped with a commode, lavatory basin and English bath.

There are spacious built-in wardrobes, one in each bed-room. The large conservatory or flower box in front of the living-cum-dining room adds to the charm of the elevation.

The staircase is wide and easy to climb and leads to another equally large, modern bed-room on the upper floor. There is a large paved terrace upstairs, part of which is covered under the roof slab.

Altogether an enviable home suitable for a large upper middle class family.

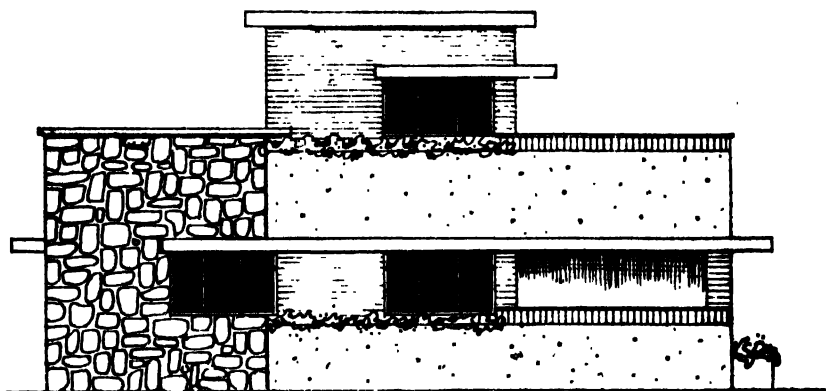


Fig. 187

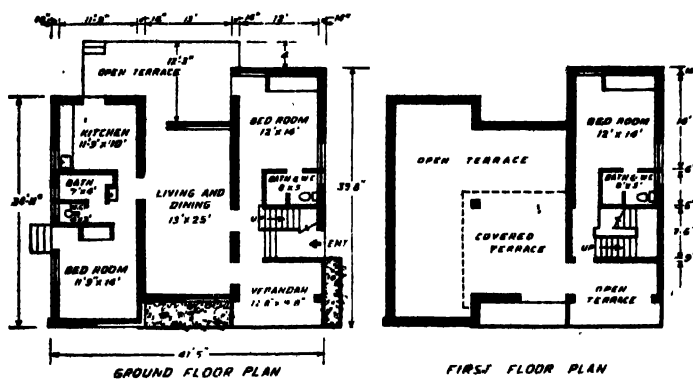


Fig. 188 & 189

Architect: R. S. Godbole, Poona.

PLAN NO. 65

PLINTH AREA: 1,470 Sq. Ft.

This little attractive home, illustrated on the opposite page, embodies the present day trend in house design. It is the result of careful study which has enabled the architect to give a house which is an example of most compact and economic planning. It provides all the modern conveniences and comforts and yet does not waste a single inch of space even in passages.

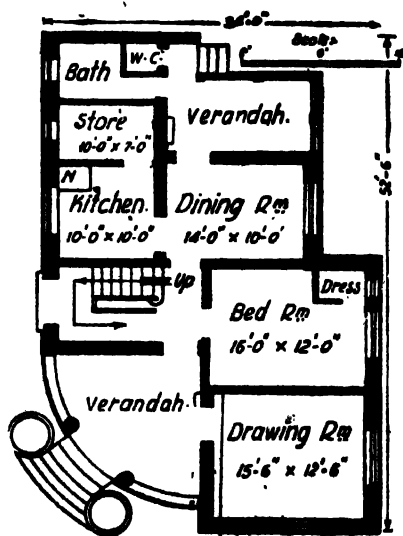
Ascending a flight of slightly rounded steps with large circular flower boxes at the ends, one reaches the segmental verandah. The drawing-hall in front of it is of adequate size. But if it is desired to enlarge it, it can be done in either, or both ways: viz., by shifting the partition between it and the bed-room a little inwards, thus making the bed-room smaller, say, 16 ft. by 10 ft., or it may be extended in the front by 2 or 3 ft., to make it nearly a square room. This would not affect the front view. The bed-room has a small cubicle inside it, which may be treated either as a dressing-room, or a clothes closet. The dining-room of good size is at a very convenient place with respect to the kitchen. The latter is of adequate size, and with a store-room attached to it for keeping all the provisions, would allow some room for two children to take their meals before going to school. The 9 ft. verandah on the rear side would serve both as a sitting-out place and a work verandah. The bath and w.c. are both very conveniently situated with respect to the rest of the house.

There is another entrance on the left-hand side under the staircase landing. If both the floors are to be used by the same family, this may be kept normally closed as too many openings are bad from the point of view of safety and privacy.

The plan admits of renting out the upper floor to another family, for which purpose the side entrance is provided. If this is intended to be done the staircase room will have to be closed from inside the ground floor. For doing this conveniently it may be necessary to provide the middle landing of the staircase outside the wall projecting on the top of the entrance steps to leave a space of three feet for access to the staircase before climbing is commenced, so that the passage to dining room on ground floor will remain free.



Fig. 190



: GROUND FLOOR PLAN :

Fig. 191

PLAN NO. 66

PLINTH AREA: 1430 Sq. Ft.

This is a plan of one of the very best houses. It was designed and constructed by an engineer for his own use. The main entrance is on a side on the left-hand corner leading through a lobby to the reception room. The latter, with a semi-circular side and bay-window in it, is approximately a square and is a charming room. Going through the lobby, one meets with the ladies' room on the left-hand side, opposite to which there is a side entrance and a back staircase. A staircase, other than the main one, adds greatly to the convenience in respect of circulation, and for servants particularly, it is a necessity. A kitchen on the right-hand side and the dining-room opposite to it form a very good grouping. Attached to the kitchen is a small store-room. The kitchen itself is a spacious room, capable of providing seats for dining for the school-going children's hurried meals, or for the morning tea. Behind it, there are two w.c.s in a row, in an inconspicuous position hidden from view. At the extreme end of the lobby there is a washing-place with a sink, which the ladies will very much appreciate. There are twin bath-rooms adjoining the passage to the back entrance, opposite to one of which there is an entrance door to the kitchen, below the bottom landing of the back staircase. A spare bath-room on the ground floor, in addition to the one for general use, is a refinement which ladies will appreciate very much.

The main staircase is easy and wide enough. The arrangement upstairs is almost similar to that on the lower floor, except that in place of the bath-rooms there is a staircase leading to the terrace, and that in place of the store-room on the ground floor there is a small wash-room attached to the bed-room, and a bath-room.

The paving in all the living-rooms is of polished Tandur, outer walls are of chisel-dressed stone-in-lime 18 inches thick, partitions of brick-in-cement mortar $4\frac{1}{2}$ inches thick, the flooring and staircases of R.C.C., height of plinth $21\frac{1}{2}$ ft., that of floors 10 ft., and concealed electric wiring. The sweeping, curved lines of the *chhajjahs* and ornamental W. I. grille-work in windows enhance the beauty of the home.

The elevation is modern and most inviting.

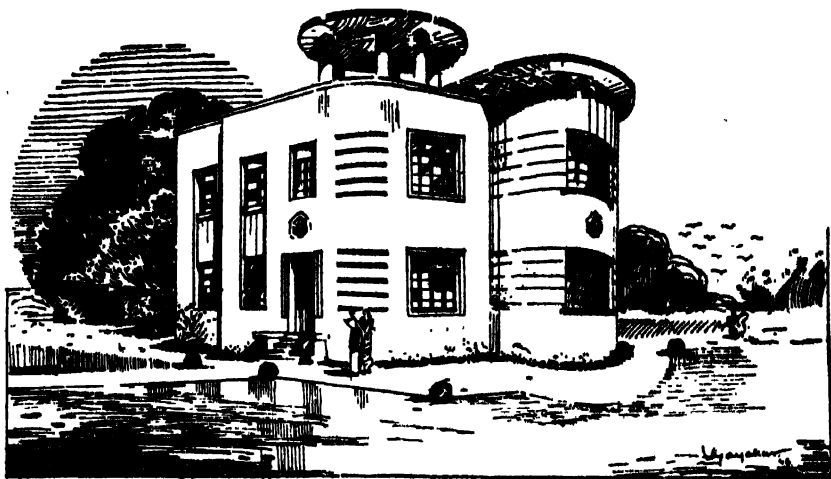
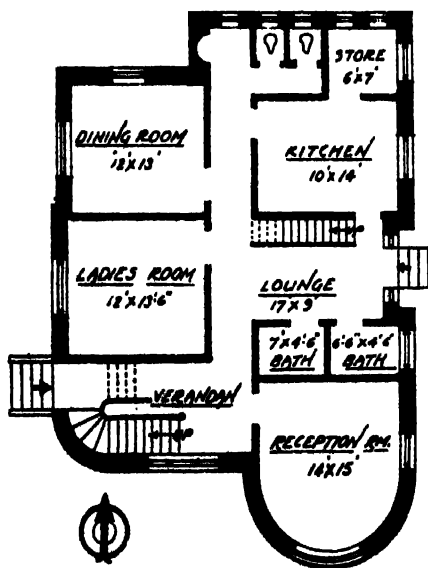
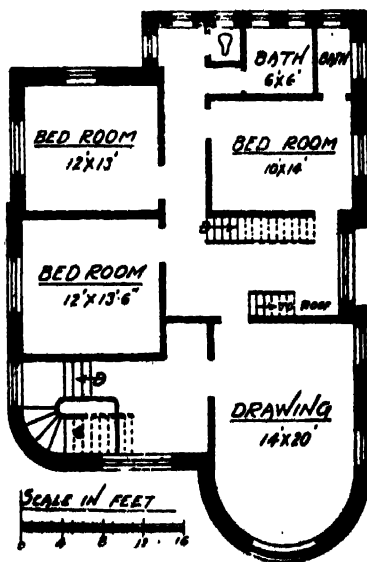


Fig. 192

GROUND FLOOR



FIRST FLOOR



Figs. 193 & 194

PLAN NO. 67

PLINTH AREA: 1421 Sq. Ft.

Though quite a plain, box-like house, it is designed for comfort and convenience, and embodies the present-day trend. The entrance opens into an open terrace on the right-hand side, enclosed by a long line of hedge, from where a door into the 8 ft. verandah is provided. Behind this verandah is a spacious drawing-room. On the left-hand are arranged the store-room, kitchen and the bath-room—all grouped together very conveniently. There is a folding partition between the dining-room and drawing-room which allows them both to be combined together when necessary. There is a spacious verandah in front of the kitchen and behind the dining-rooms. Along one side of it is placed a staircase which has only one straight flight of steps. In front of the dining-room and alongside the front verandah is a large, open terrace, enclosed for privacy by a hedge about 5 ft. in height. This terrace would serve as an excellent outdoor dining-place. The ample open terrace on the right-hand side, which also is enclosed by a long line of high hedge, would prove an ideal place for children to play under the supervision of the lady in the ladies' apartment, or an outdoor sitting-room under the shade of the trees, where two lounge chairs and a teapoy show its usefulness as an outdoor resting place for the family. The arrangement on the upper floor which is drawn to a larger scale is equally modern. All the five bedrooms are open to the south-west breeze. Though the two middle bedrooms are small, each of them has an ample clothes closet of 6' x 3' size, which is provided in an extra space. There is a wide balcony in front, but as it faces west, a long, projecting canopy over it is a necessity for protection from the rains and evening sun, though it is not shown in the elevation.

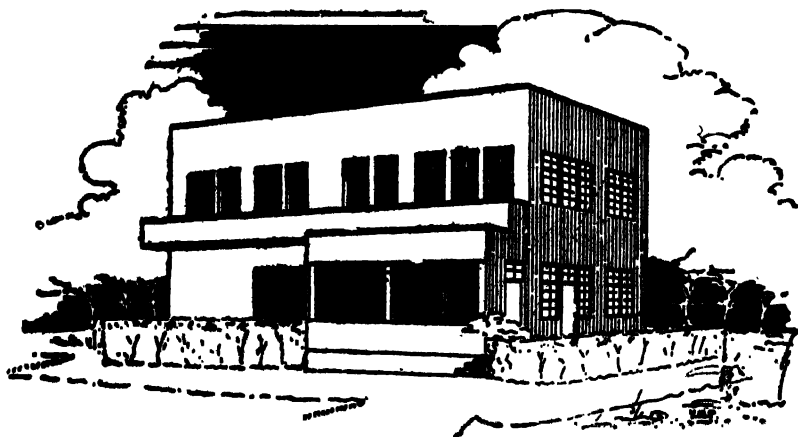


Fig. 195

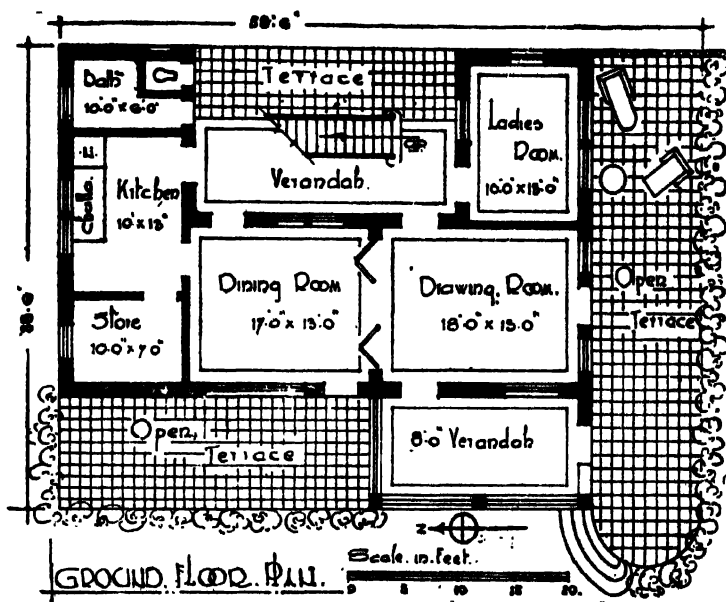
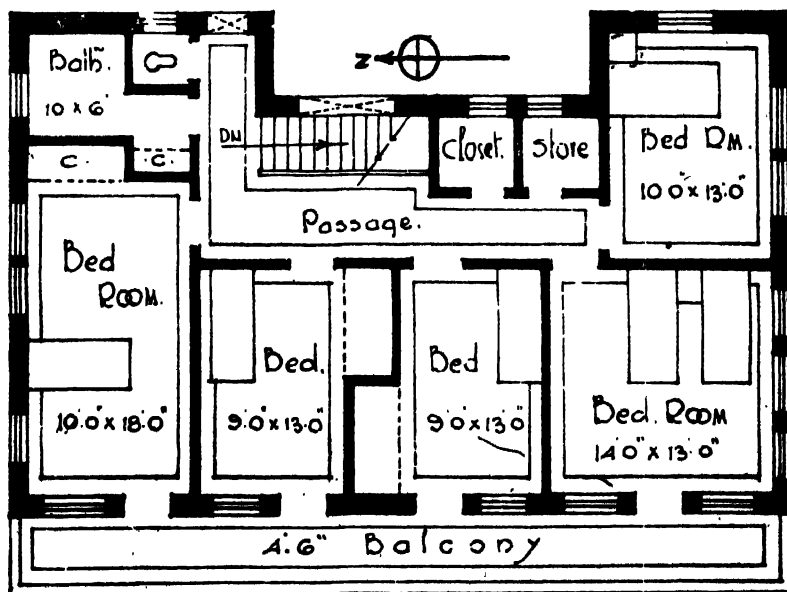


Fig. 196



FIRST FLOOR PLAN.

Fig. 197

PLAN NO. 68

PLINTH AREA 1560 Sq. Ft.

The home pictured on the opposite page blends perfectly all the essential elements of a fine design—beauty of simple lines, balanced masses on the exterior, and a sound and practical interior arrangement. One is struck at the first sight with its air of domesticity and promise of comfortable living inside. The effect is not brought about by any elaborate attempt at picturesqueness. The whole scheme is original and natural.

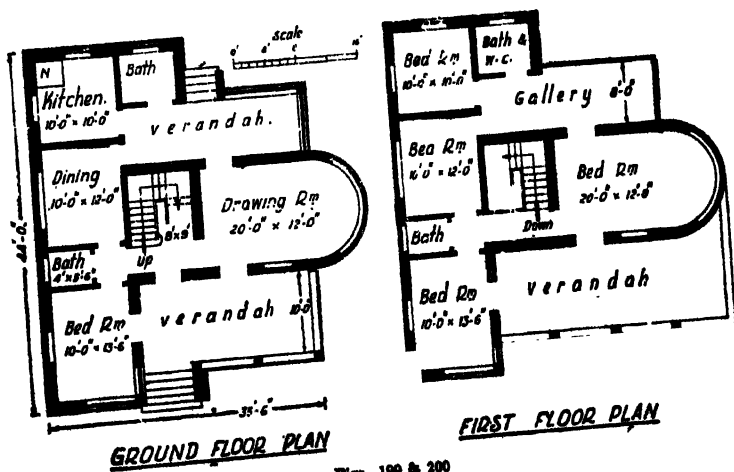
The front verandah which is ten feet deep makes an excellent sitting place in an informal manner. The staircase, which can be as attractive as desired, occupies the heart of the home, and can be approached independently from any room. The drawing-room with verandahs on two sides and the staircase on the third is as if isolated from the private rooms of the house, and is thus most suited for all formal and ceremonial occasions. The wide sweeping segmental window makes it the more cheerful. The bed-room on the front has an attached bath-room. The kitchen and the dining-room are conveniently grouped together and are of suitable sizes. There is no separate store-room. However, if the height of the bath-room adjoining it and part of the verandah behind the staircase, is kept 7 ft., an excellent loft can be formed on its top, which can be reached by a ladder. As the house is designed for the mofussil area where there is no water carriage system, the latrine is in a separate block outside the main building.

Upstairs there are four bed-rooms. The main or the master's bed-room is open on three sides. If an attached bath-room is required it can be provided in the gallery at the back with an entrance from inside the bed-room.

The same staircase leads to the flat roof terrace on the top of the main bed-room. The elevation is most attractive.



Fig. 198



Figs. 199 & 200

PLAN NO. 69

PLINTH AREA: 1,690 Sq. Ft.

This is an economically and compactly planned but spacious luxury home for a family of upper middle class, in which there are all the elements which go to make a home the real pride of the family. Maximum privacy, free circulation, the best flexibility, and ample room for every activity of every member of the family are everywhere in evidence. The beauty brought about by simplicity of mere outline is obvious. In the elevation shown in Fig. 201 there is a nice blending of the traditional tiled hipped roof and modern wide sweeping curves of the chajjahs and plane surfaces without ornamentation.

The curved steps with concrete flower boxes at the ends lead to the vestibule at the entrance under a wide curved canopy with a concealed electric light in its ceiling. As one enters the staircase hall he finds two doors on the left-hand side: one leading to the drawing-hall and the other to the dining-room. Both these rooms can be combined by removing the folding partition between. The drawing-hall is quite modern with a wide horizontal window and a concrete flower box projecting outside it. The dining-room is the largest room in the house and very conveniently situated with reference to the kitchen. The woman is not forgotten. A special room is allotted to her in a place equally prominent as the men's drawing-room, with a convenient entrance from the kitchen side so that the privacy of this room is maintained. Next to it is the comfort room in the corner with two large windows in two directions, and a bath-room attached to it. This room is within easy reach from the kitchen and would be most appreciated by the aged or the sick members.

The store, pantry and bath are in a line separated by a passage. The kitchen is of adequate size and has two windows and a spacious verandah in front. Behind the drawing-room is a small room which may be an ideal room for study or office with an entrance to it from the back.

The bed-rooms upstairs which are large and have separate bath-rooms to each are so arranged that each can be independently approached through a small lobby. If a door is provided behind the staircase instead of the closet shown the terrace could be entered from the bed-room on the right-hand side.

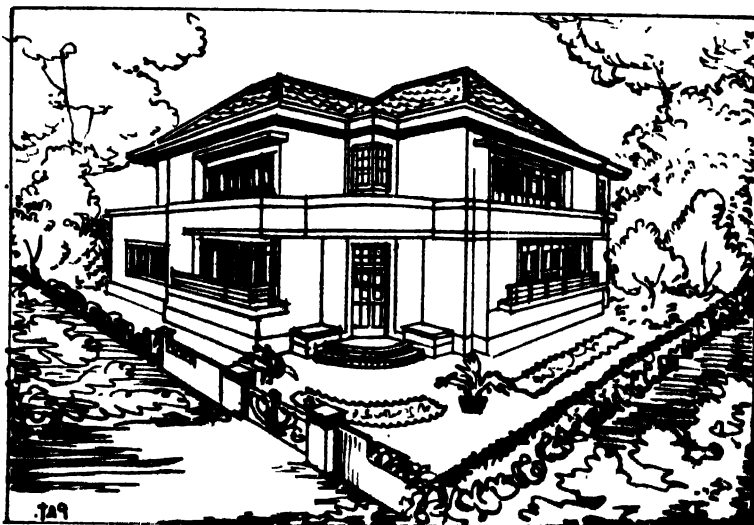
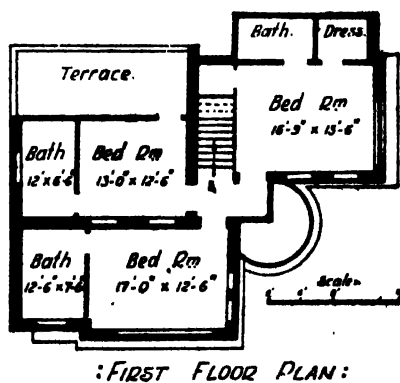
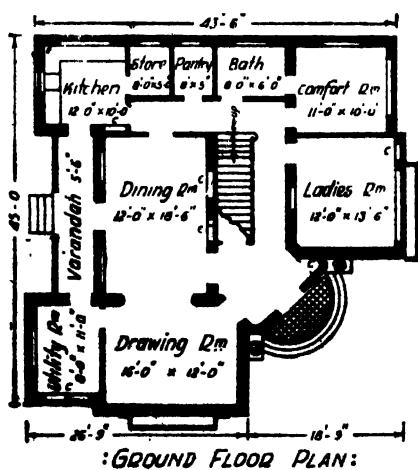


Fig. 201



Figs. 202 & 203

PLAN NO. 70

PLINTH AREA: 1706 Sq. Ft.

The two bay-windows, one in the front bed-room and the other in the dining-room, have added spice to the otherwise quite plain architecture of this cottage. There is a spacious verandah in front, with an entrance on one side of it to allow the whole space on the verandah for use. There is a spacious lobby which may be called even a staircase hall, in front, to preserve the independence of each room. The large front room with a bay-window facing west would be very enjoyable. The staircase has its entrance in a lobby, making it easy of access from any room in the house. The drawing-room is square and not a large one; however, as the partition between it and the dining-room is foldable, both these rooms can be combined any time when occasion demands it. The dining-room, with the semi-circular bay-window facing the west, is oblong and would be of greatest service. The kitchen is close to the dining-room and is of ample size. The store-room also is large and placed at a convenient situation. The bath-room is isolated by a lobby, so that it can be entered directly from any room. There was no necessity of the verandah behind the bath-room, but some washing-place for burnishing utensils, etc., is required for a maid in Indian homes, and as far as possible, it should be away from the kitchen and living-rooms and, therefore, this would be a most convenient place for it. The w. c. has found a very good place below the staircase landing, where it is convenient and inconspicuous. On the upper floor, three bed-rooms, a bath-room and a verandah in front, are arranged, but it is possible to build even five bed-rooms; the fourth on the rear terrace, and the fifth in place of the bath-room, if the latter is extended right up to the dotted line, i.e., upon the top of the washing-place below. The bath-room, in that case, can be pushed back on the top of the 5' 6" verandah. The bath-room, required near bed rooms in Indian homes, is not necessarily for taking a bath, but to be used as a general toilet-room and therefore, a room of even a small size serves the purpose quite well.

The elevation is neat and attractive. The sizes of all the rooms are quite decent for this class of cottage.

A side-entrance near the staircase is specially provided to meet the contingency of treating the upper floor as an independent flat, if and when required.

For the sake of economy, the L-shaped verandah 5' 6" wide behind the bath room may be omitted as it serves no important purpose.

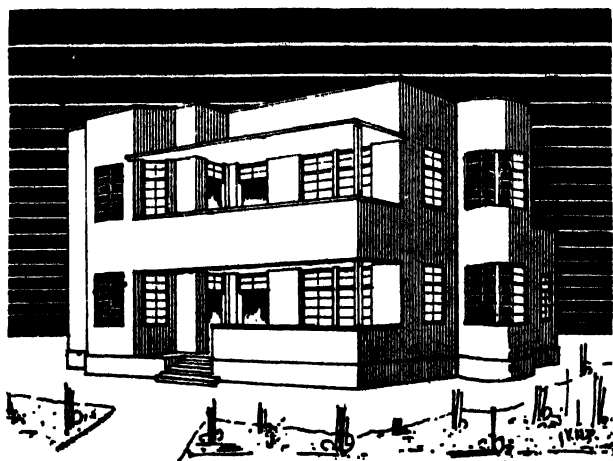
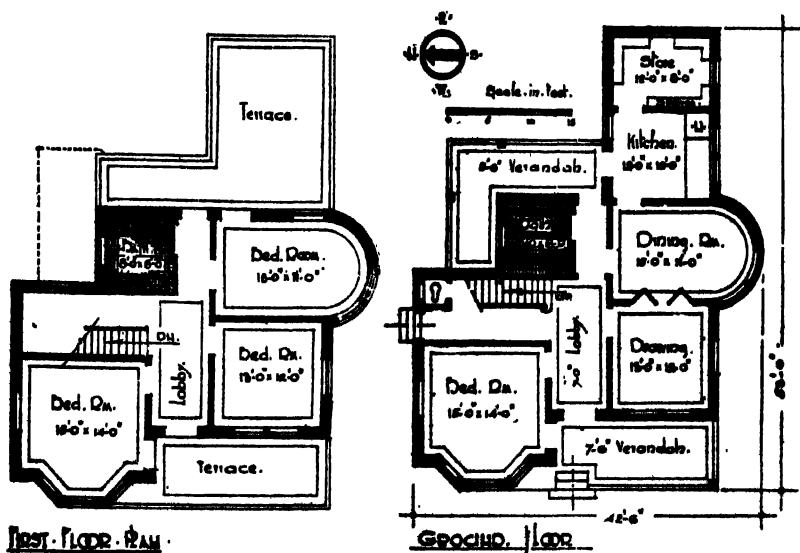


Fig. 204



Figs. 205 & 206

PLAN NO. 71

PLINTH AREA: 2156 Sq. Ft.

In planning this home, utility and beauty were considered together. It possesses such a charm and distinction that even princes might envy its proud possessor. The home is, in fact, one room thick, but the wide frontage it occupies gives it an appearance of a mansion. The wide, open terrace running round three sides, the sweeping lines and the projecting, long, oval, cantilever canopy upstairs are some of the distinctive features.

The entrance is in the right-hand corner of the open terrace. The latter is protected by a projecting chhajjah. On the right-hand is a day-nursery for children, a large room very well lighted and ventilated. Close to it is the ladies' apartment from which the children's activities can be watched. Beyond it are the kitchen, store-room and a small verandah. The bath and toilet are in a convenient corner. The dining-room is an unusually large room and is close to the kitchen. Close to it is a gents' informal sitting-room, which could be used either as an occasional bed-room, a smoking-room, a study, or a seclusion room. There is an excellent sized drawing-room in which the furniture, including a grand piano, is shown. There is a long, fixed seat along one side. On the rear side of these three rooms is a spacious verandah ten feet wide, in which, at one end, is placed the staircase.

Four bed-rooms are arranged on the upper floor. The one for the master is very large and luxurious. There are two bath-rooms, one at each end, and also two terraces. The large terrace on the left can be reached either by the rear verandah or the front lobby, in the form of a passage on the terrace. The long, projecting, cantilever canopy over the verandah lends boldness to the design. Every bed-room is open to the south-west breeze, and there is a lot of closet or cupboard space provided in each.

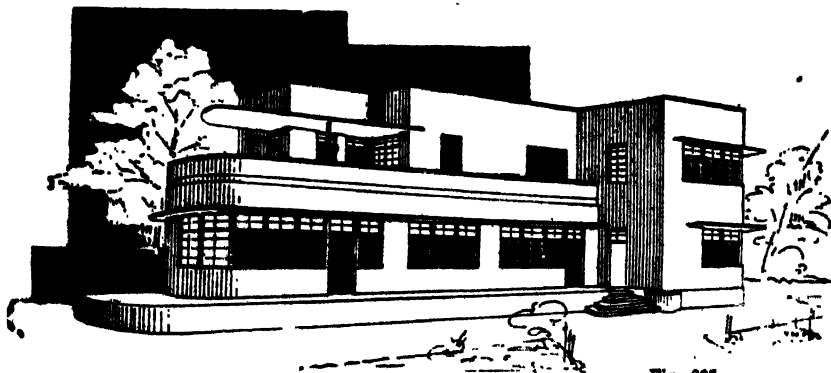


Fig. 207

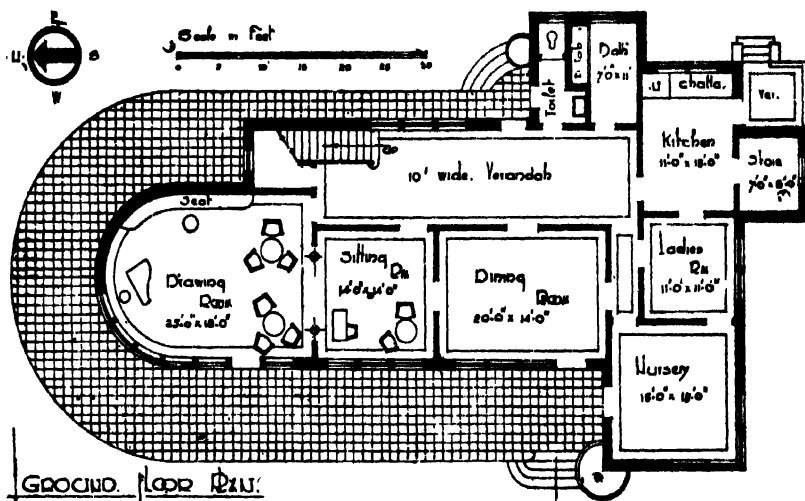


Fig. 208

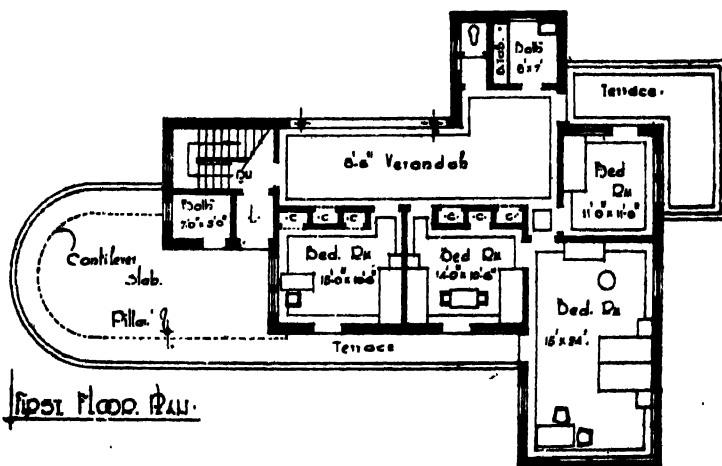


Fig. 209

PLAN NO. 72

PLINTH AREA: 2140 Sq. Ft.

Here is a home which contains all the essential elements of a fine design—beauty without vain ornamentation, strength and stability firmly impressed on the exterior, and interior arrangement, sound and practical. The employment of rough-dressed stone in the exterior gives it an appearance of strength, the stream-lined, sweeping, round chhajjah and the wrought-iron grilled windows in the verandah, give it the simple charm of modernity and the symmetrical front gives it a grace of balance and proportion. Thus, there is a nice blending of the traditional and modern architecture in it.

The quarter-circular deep verandah in the front, though on account of the central passage not so useful on the ground floor as on the upper one, is the central feature in the elevation. On its left-hand side is a beautiful drawing-room of ample proportions, with an attractive semi-circular bay-window, and beyond it is a bed-room open to the western breeze. Corresponding to these are the ladies' room and kitchen, symmetrically placed with respect to the central verandah. The position of the ladies' room is very appropriate. It has the necessary prominence almost equal to that of the drawing-room for men and, at the same time, is quite close to the kitchen and dining-room—the centre of the woman's home activity, even though a cook and a maid might be in employment. Attached to the kitchen is a small store-room, and a back entrance is provided through the dining-room. There is a paved, open yard behind, on one side of which are arranged two w. c. s and a bath. The stair-case is centrally situated, and is approachable independently from any room. It is made wider at the entrance.

The back, open courtyard, would serve as an ideal room for children to play about.

Upstairs, either five bed-rooms and a verandah may be arranged, or the same suite of rooms as on the ground floor, repeated with a view to letting it out to a family as an independent flat. However, the staircase is not conveniently placed for doing the latter, without disturbing the privacy of the family occupying the ground floor. The verandah on the upper floor would be an excellent lounge as there will not be a through central passage in it as on the ground floor.

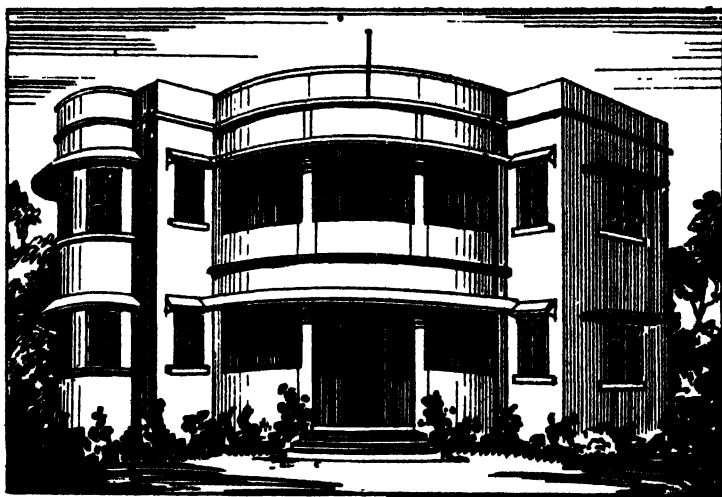
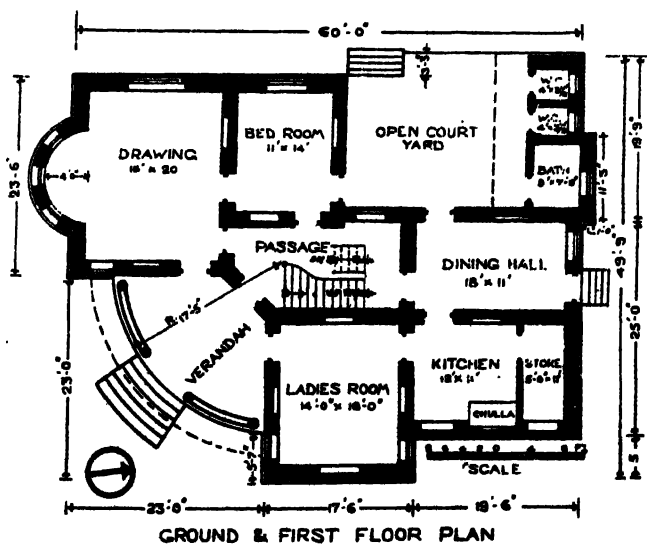


Fig. 210



GROUND & FIRST FLOOR PLAN

Fig. 211

PLAN NO. 73

PLINTH AREA: 2260 Sq. Ft.

The plan represented by Figs. 213-214 is one of the most beautiful villas suitable for a large family belonging to a richer class, living either in Indian or European style. It is also one of the most economical designs in which every inch of space is utilised to the best advantage.

One enters the quarter-circular front verandah by ascending a flight of steps, on both sides of which concrete flower-boxes are provided. On either side of the verandah are placed two large rooms, symmetrically situated with respect to the axis across the verandah. One of them is a drawing-room, and the other is called an office room, but their functions should be interchanged and the present drawing room may be used as either a bed-room or a "comfort room" in the proximity of the kitchen and w. c. necessary for a comfort room. In front of both these rooms, concrete flower-boxes are projecting from the large windows.

Behind the front verandah, a small staircase hall is placed with a closet in the right-hand corner for overcoats, canes, umbrellas, etc. Two w. c. s. and a toilet room with a urinal are also provided opposite it. A very convenient and easy staircase in two flights is arranged in the staircase hall. This can be treated as one of the artistic features. Behind it is a spacious dining room, and on one side of the latter are placed the bath-room, kitchen, store, with a passage in their front leading to the back verandah.

Those who do not like the idea of having a kitchen close to the dining-room in a house of such proportions and refinements, can have it in a separate block outside, connected to the main building by a covered passage, and convert the present kitchen into a bath-room and the present bath-room into a pantry and dispensing room.

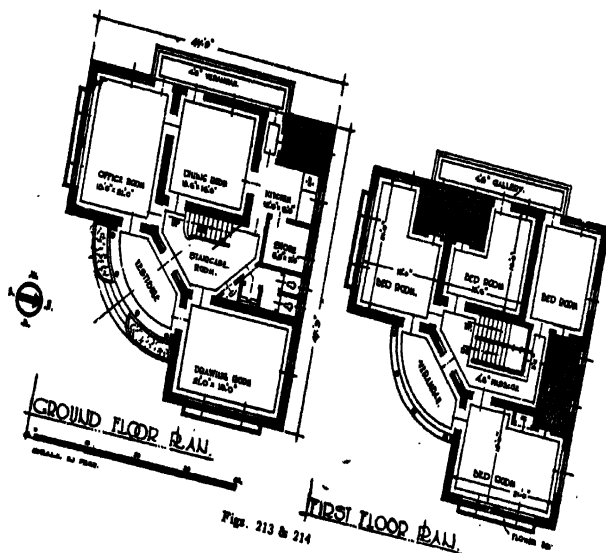
On the upper floor, four spacious bed-rooms, with their own bath-rooms, are arranged. Not only every bed-room has an independent access to it, but the front promenade, viz., the verandah, could be used as a common sitting-room with an independent access from any room.

The front view is as beautiful as could be desired, without any ornamentation.

Thus, considered from every point, the house is sure to prove the pride of the occupants.



Fig. 212



Figs. 213 & 214

PLAN NO. 74

PLINTH AREA: 2275 Sq. Ft.

This is one of the most beautiful homes of the mansion type, and solves the problem of people belonging to the class of the nobility, such as Rais, big Zamindars, Jagirdars, mill-owners, etc., who want to maintain a certain standard, and still do not want to waste money in unnecessary luxuries. On the ground floor, where a number of visitors are to be interviewed, the planning is rather on a liberal scale, whereas, the upper floor is most compactly planned.

This plan has several unusual and original features in it. At the entrance, there is a perfectly circular, large verandah, which might serve as a waiting-room for visitors, who will, from its shape and size, gather the first excellent impression of the grandeur and magnificence. On the left-hand side is a large drawing-room, very well lighted. Behind the circular verandah is a semi-circular, large staircase hall. This room will receive its light partly from the rooms on the sides and mainly from the large window in the front wall at the top. An easy and luxurious staircase is provided in this hall which would serve two purposes—firstly, as an ornament or the central feature and, secondly, as the means of communication with the upper floor. A lift can be installed in the well of this staircase. There is another staircase provided for the use of servants. The dining-room is large enough and symmetrically situated in the front. The kitchen and store are close-by behind it. But, if it is desired that the kitchen should be away in a detached block, the present kitchen and store-room may be converted into a large dining-room with the kitchen block connected to it by a covered passage. The present dining-room can, in that case, be used either as a guest-room or a library. There is a study-room on the rear side in the left-hand corner, which some families might like to use as a ladies' sitting-room or a guest-room. There is, besides, a large bath-room, and a back entrance through a deep verandah.

On the upper floor, there are five very good sized bed rooms with three bath-rooms. If one bath-room is made common to two bed-rooms, the master's bed-room will have its independent bath-room. The "box" on the left-hand side of the staircase on the upper floor, if opened on the terrace side, would provide an independent access to the front terrace from all the rear rooms.

The elevation is most delightful and modern. A house occupying a space of about 58' × 40' and providing six living-rooms, with all the amenities which the modern civilised life requires, is really a marvel.

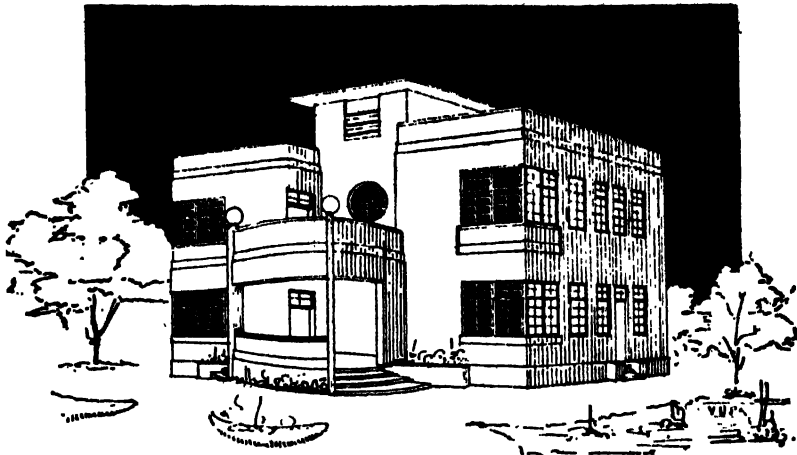
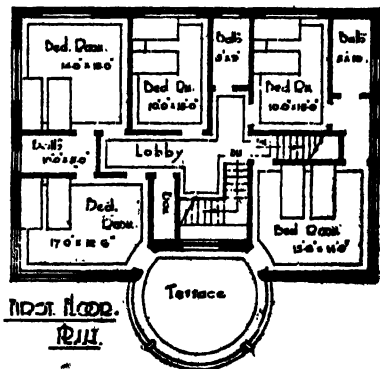
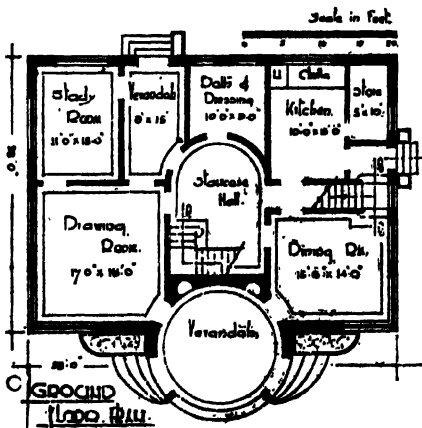


Fig. 215



Figs. 216 & 217

Row-Buildings or Terrace Houses

THIS is the cheapest and simplest type of dwellings suitable for very poor classes. They are mostly erected in industrial cities where the cost of land, particularly on the front, lining the streets, is very heavy. Reducing the width of the house-front helps in lowering the cost of the building scheme. This fact has led to the construction of row-buildings, which consist of narrow tenements divided by common side walls. The disadvantages of row-buildings are that the houses are narrow and since the side walls are closed, light and ventilation have to be derived only from the front and rear sides. However, in respect of privacy and independence, they are better than *chawls** which are mostly peculiar to Bombay. Row-buildings have the further advantage even over "Flats" that they all have an equally favourable aspect in respect of sunshine and breeze. In the case of "Flats" or apartment buildings, whereas the tenements on one side derive the full benefit of proper orientation, those on the other side are quite at a disadvantage in this respect.

Row-houses are very popular in Germany, Denmark and Holland. U. S. S. R. has also adopted them in large numbers. In England, France and the U. S. A., however, flats are preferred to them.

While designing houses for the working classes, their habits, and religious sentiments must be considered, e.g., roof ventilators, clerestory windows, concrete *jalis* just below ceiling, honey-combed portions of wall, etc. should be provided for fool-proof ventilation, even though the windows may be closed through fear of draught, or for security. Similarly a number of gadgets, such as wall cupboards, shelves, pegs, lofts, cradle-hook, roof pendants, drying lines, etc., which go to compensate for reduced floor area, should be provided in abundance.

* *Chawls* are a sort of row buildings, generally 2, 3, or 4 storeys high, consisting of separate tenements of a single, or at the most 2-rooms, one behind the other. There is only one central staircase serving a number of tenements on either side, which opens into a passage 4' or 5' wide running in front of the tenements on every floor. Each tenement is separated by a party wall. One or two wash-houses or bath-rooms, and a few w. c.s which are always inadequate in number in an annexe on each floor are provided. As they are used in common nobody is responsible for their cleanliness. The chawls thus tend to establish a low standard of comfort and decency and have a demoralising effect.

PLAN NO. 75

PLINTH AREA 450 Sq. Ft.

The building pictured below is one of the cheapest type of row houses, with a single tenement of a kitchen and a living room on each floor. There is an independent entrance to the upper floor. The rooms are fairly large. It is possible to provide wall cupboards in the thick side walls. The bath room and w.c. on the rear side are common to both floors, for reaching these there is a separate staircase.

Fig. 218

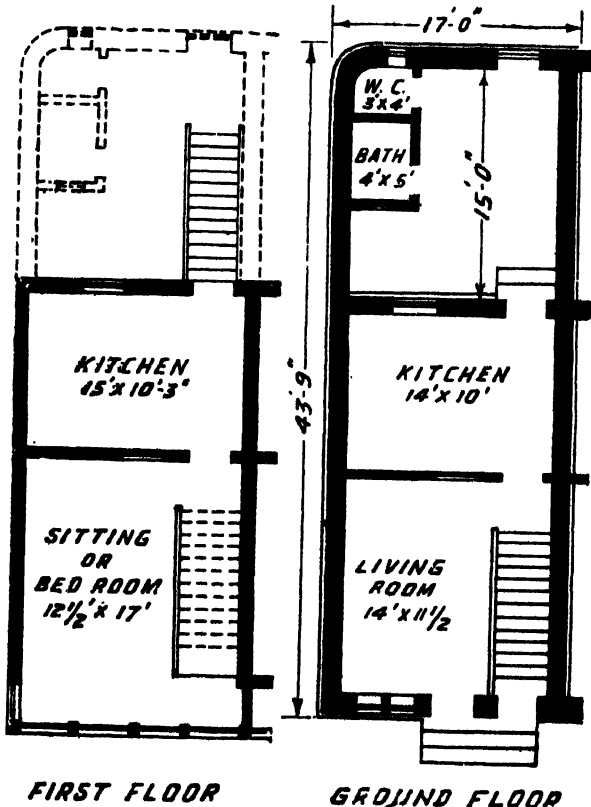


Fig. 219

The space below the staircase is useful for keeping cycles or a perambulator on the ground floor. To compensate for this extra convenience the front portion of the upper floor is projected by supporting on cantilever beams, to make the front room 4 ft. longer.

PLAN NO. 76

PLINTH AREA: 440 Sq. Ft.

The plan shown in Fig. 220 is on the same lines as the previous one and has the same area, but it can be used either by two tenements, one on each floor, or by one family only. There is a bay window in the front. The partition between the kitchen and the sitting-room should be provided with a wide but low window near the ceiling so as to ensure privacy and, at the same time, through ventilation.

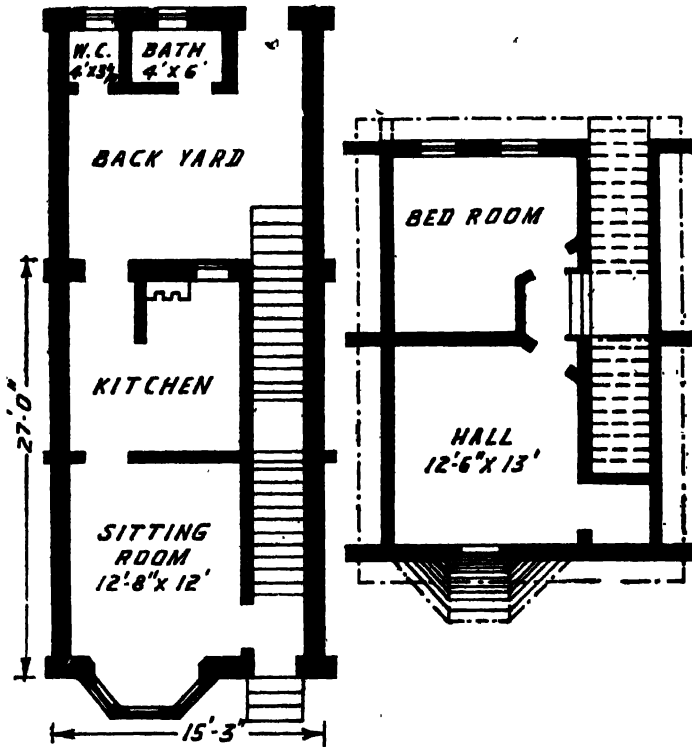


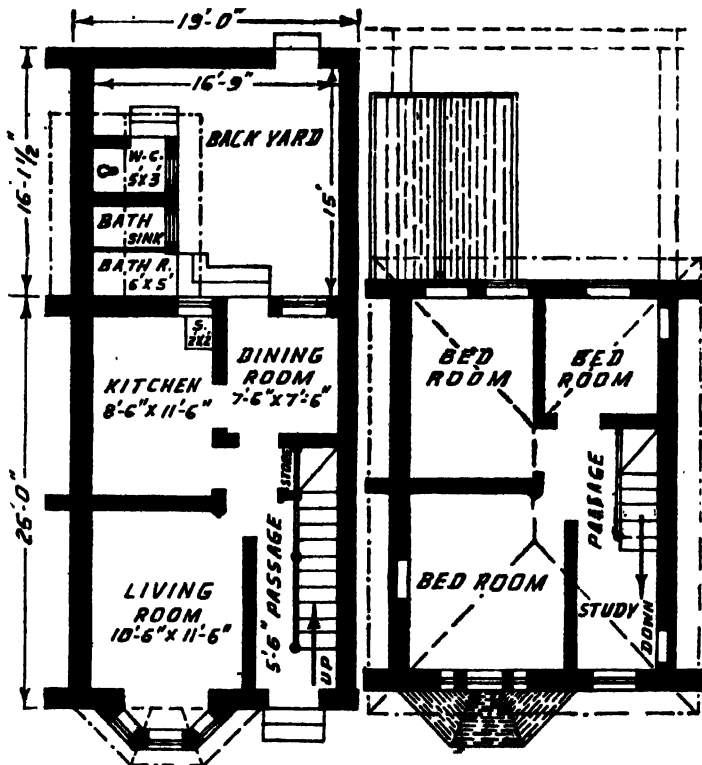
Fig. 220

The staircases in such small homes should not have any winding steps so as to minimise accidents. This should be done even at the cost of an easy rise. $8\frac{1}{2}$ " or even 9" height of steps is justifiable if, thereby, winding steps could be avoided. This has been accomplished in this plan.

PLAN NO. 77

PLINTH AREA: 564 Sq. Ft.

This is one of the most economical plans, in which every inch of the space is utilized to the maximum advantage. In a very small space, three rooms on the ground floor and four rooms upstairs, each with independent access to each, and adequately lighted and ventilated, have been provided for. The two winding steps at the top should preferably be avoided by increasing the rise of every step by an inch. Though a terrace house, its design is suitable even for a decent middle class family of 7 or 8 members.



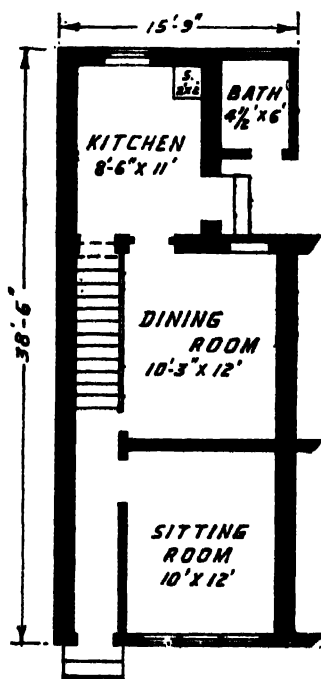
GROUND FLOOR PLAN FIRST FLOOR PLAN

Figs. 221, 222.

PLAN NO. 78

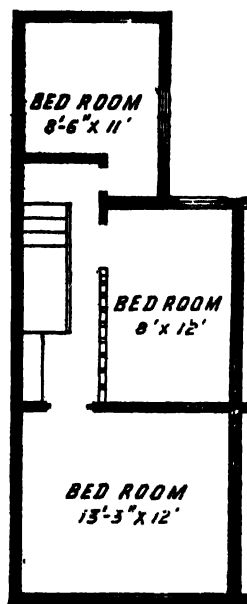
PLINTH AREA: 575 Sq. Ft.

The frontage width of this house is only 15 ft. between the centre lines of side walls. There are three rooms, one behind the other; still, each room derives direct light and ventilation from exposed walls. The bath-room is very conveniently situated. There are three rooms upstairs with an independent entrance to each. The accommodation is plentiful and decent enough for a fairly large middle-class family.



GROUND FLOOR

Fig. 223



FIRST FLOOR

Fig. 224

PLINTH AREA: 930 Sq. Ft.

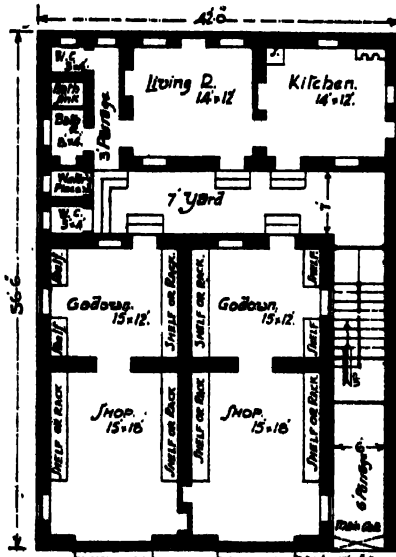
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GROUND FLOOR PLAN FIRST FLOOR PLAN

PLAN NO. 80

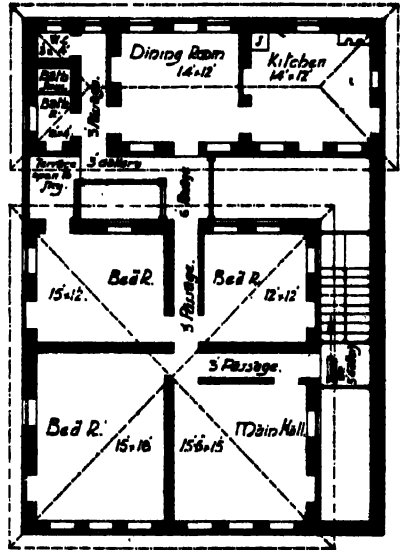
PLINTH AREA: 2373 Sq. Ft.

This is yet another plan with a shop front. There is a row of two shops in a line, behind which a godown is provided. An open yard behind the godowns separates the shops from the residential block. There is a separate entrance on the right-hand side for the latter. A small tenement of a kitchen, living-room, a bath and w. c. on the ground floor may be separately rented out. There is a separate bath and w. c. for the use of the shop assistants. Upstairs, there is very decent accommodation of 4 large rooms, kitchen, dining, and bath, etc., for an upper middle-class family.



: GROUND FLOOR PLAN :

Fig. 227



: FIRST FLOOR PLAN :

Fig. 228

PLAN NO. 81*
AREA OF EACH TENEMENT 336 Sq. Ft.

This is a plan of four tenements in a row, suitable for working classes, consisting of a verandah, living room, kitchen, bath, w. c. and a space instead of a room for beds, in which it is possible to provide two bunks closed by screens. The w. c. opens on the back side and is common to two tenements.

*Courtesy: The Concrete Association of India.

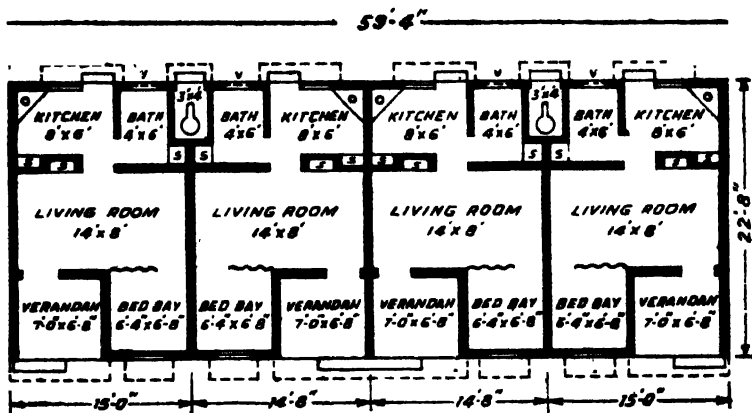


Fig. 229

PLAN NO. 82
AREA OF EACH TENEMENT 425 Sq. Ft.

This is another plan suitable for the working classes. It is a multi-storied building with four tenements on each floor. It consists of a living room, kitchen, bath, w. c. and two small verandahs in front and rear on ground floor and corresponding balconies on the upper floors.

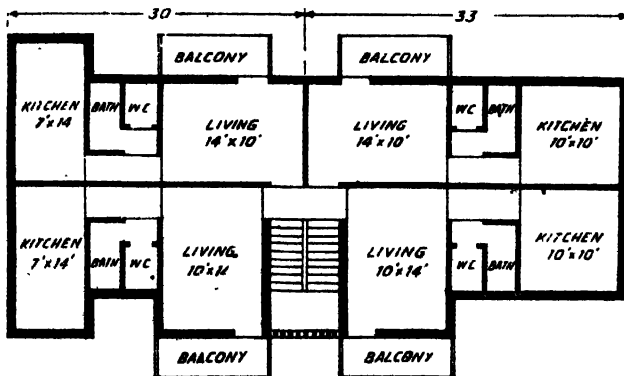


Fig. 230

Kitchens in the left hand tenements are longer and narrower than those in the right hand sides, though the floor areas of both are practically the same. As it is a multi-storeyed building, there is a saving in land. This plan is a great improvement on the previous one. The windows are not shown, but their positions are obvious. Light can be derived even from the sides in the end rooms.

PLAN NO. 83

AREA OF EACH TENEMENT 900 Sq. Ft.

This plan consists of a ground floor structure in which any number of tenements can be built in a row. Each tenement consists of a living room, $20' \times 10'$, two bed rooms, each of $15' \times 10'$, a kitchen, $10' \times 10'$, front verandah $20' \times 10'$, and rear verandah $10' \times 10'$. As the tenements are separated by common dead walls, light has to be derived from the front and rear only.

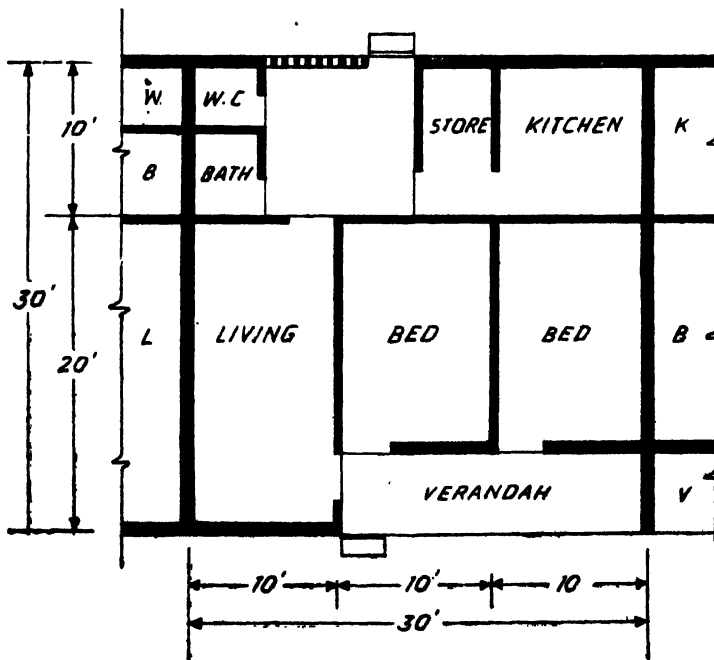


Fig. 231

Flats

A FLAT is a self-contained, convenient, small dwelling, within a large building. It is called an apartment house in America. Flats are very popular in the advanced countries of the world, and may be counted by thousands. Notable instances of such modern flats are those at the Mosholu Parkway in New York and Carl Marx and other huge buildings in Vienna. One of the latter is 1,500 metres, or more than $\frac{3}{4}$ of a mile long, four storeys high, and houses nearly 8,000 families, in fact, a large town in *one* building!

Flats are quite different from *chawls*, which are perhaps peculiar to Bombay. The latter are buildings, generally three or four storeys high, consisting of a number of separate tenements of one or two rooms, but not more than two rooms, divided by their party walls, with a common passage four feet wide, either in the front or the rear. They are provided with a few wash-houses and w. c. s, usually inadequate in number, for common use in a separate appurtenance connected by the common passage. The rooms are packed together and piled up in a very limited area, with no gardens, no separate yards, and absolutely nothing by way of privacy outside the front door of the rooms. They tend, in general, to establish a low standard in respect of comfort and decency, and thus have often a demoralising effect.

Flats, on the other hand, are separate blocks of buildings, having one or, at the most, two tenements served by one staircase. Each tenement has a complete suite of rooms, giving all the accommodation for a family to live decently and in comfort. Each block of flats has its own garden, or at least an open yard enclosed by a compound wall or a hedge.

Until a few years ago, flats were rare, even in cities like Bombay. But, little by little, people came to appreciate them, as they possess several advantages—both economical and social—over cottage homes, and today they may be found not only in the suburbs of large cities, but also in small towns. At first they were built for families of the middle class only, but there are many flats *de luxe* now, which are occupied by the well-to-do people as well.

The flats owe a good deal of their popularity to the desire on the part of people to leave the heavily rented, dingy houses built by speculative investors in congested areas as a business proposition, and to go and build their own homes on the outskirts of towns. Though the economic gain was not much in the beginning, still, they could be independent of the unreasonable

demands of their landlords, and after some time realised that the general standard of the health of their family had definitely risen as a result of the open air and cheerful surroundings. Many of the people who laid by some spare money, either in service or in business, found it a very safe and convenient investment to build a flat, part of which they could themselves occupy, and rent out the rest to people of their own status and thus, while living happily, could also earn some profits.

Thus, a flat essentially possesses a business aspect to a greater or less extent. In order, therefore, that it should prove a successful investment, its planning technique must be closely observed. The following are some important considerations:

(1) That it should be designed for one class of people, keeping in mind their average income, social customs, and all other circumstances governing their mode of life.

(2) That middle class families have to keep up a certain status in society, very often beyond their means. Therefore, a flat, designed for such a class of people, should appear to be stylish and should show a high order in the workmanship and the materials employed in its construction, particularly so in the principal rooms, so that no casual observer should gain an impression that the rents are low.

(3) That tenements on the ground floor, close to the public road, should possess means, such as a high plinth, a trellis-work or a close-meshed railing in the verandahs and windows,—means which are conducive to preserve the privacy of the family from the gaze of the passers-by.

(4) That there should be an entrance vestibule, no matter if small, to every tenement, so that the visitors can wait for some time, before being ushered into the reception room.

(5) That the main entrance should form an attractive feature.

(6) That the fewer the corridors the better it is, in the interest of economy of the living space. At any rate, they should be so planned that they do not form a vista from the entrance.

(7) That when there are two tenements on the same floor, side by side, the windows of one, at least in the important rooms, should not overlook those of the other.

(8) That the supply of conveniences, such as shelves, cupboards, storage space for fuel, lines for drying clothes, etc., should be ample. The landlord should make the utmost of every available space for storage requirements. Thus, lofts can be provided over service rooms, such as the bath-room, the lavatory, the pantry, etc., where even a seven foot head-way may be sufficient.

(9) That one main staircase for one flat is preferable to one serving two flats, side by side, on the same floor. One flat served by an independent main staircase affords greater privacy and gives an idea of not being restricted by the presence of a neighbour; however, there may be neighbours in the adjoining flats on the same floor, not served by the same staircase, but by different ones.

(10) That instead of keeping several small *chowks* or court-yards open to the sky for the purpose of lighting and ventilating, all the space available should be combined to form one large *chowk*. Since small court-yards are difficult to clean, they tend to accumulate rubbish, and the windows overlooking them become merely inlets for foul gases when the rubbish rots.

(11) That if a drain has to pass under the floor of a certain part of the structure, all possible precautions, such as an extra bedfall, means of inspection and repairs, etc., should be provided to make the entire arrangement fool-proof.

(12) That the arrangement of only one flat on each floor has the advantage, like cottage homes, that each room could be arranged according to its proper orientation.

(13) That since a staircase assumes a special importance in the case of flats, the following points should be noted:

(a) It should be broad and easy to climb.

(b) It should be fire-proof. In this connection, it may be mentioned here, that an iron staircase, or a staircase in which there is a preponderance of iron, in an exposed position, is worse than useless in an emergency like fire, as it is liable to get hot—even red hot—and in that case it cannot be used.

(c) There should be preferably another staircase at the rear for servants, and this should be independent for each flat *de luxe*, since much annoyance is likely to be caused, if servants of two flats on the same floor, meet on the common staircase and converse with each other at the sacrifice of work. Such a service staircase is useful, also, as a means of emergency escape.

(d) An internal staircase, with only top light and ventilation, is very bad in high buildings. In the event of fire it behaves as a chimney shaft, at least gets full of smoke, making an escape impossible.

(e) When a staircase is at or near the entrance, it affords opportunities for the architect to make it a central architectural feature. Again, if it can be made a part of the entrance hall scheme, it produces an effect of spaciousness, which is valuable in creating a pleasant impression on the mind of the visitor.

These principles are illustrated in the following designs of flats:

Two Room Flats

PLAN NO. 84

PLINTH AREA: 1050 Sq. Ft.

This is a plan of a building having two flats only on each floor. The staircase is at the entrance and the architect, taking advantage of it, has treated it as a central architectural feature. The entrance porch is projecting a little, over which a canopy is provided. Each flat consists of two rooms only, but unlike a chawl, an independent bath-room and a w. c. are provided for each. A loft is constructed on the top of the bath and w. c. at 7 ft. height above the floor. The entrance to the staircase on the ground floor, serves as the vestibule for the flats on that floor, and the upper landings, for the floors above. For the first and second floors, balconies at corners are provided which are wide enough for a person to sleep in the open air. The flats face the West, and therefore, there will be plenty of breeze in the front rooms.

As the flat contains only two rooms, it certainly does not provide the necessary amenities of life. Still, where the cost of site is very high as in Bombay, the rents also are high, which the middle class people cannot afford to pay. There are, however, hundreds of young people, newly married, starting to keep house, who very readily go in for such flats, which, except for the restricted accommodation, provide all the amenities of a decent living. These people shift to more liberal quarters upon the arrival of a baby or two, by which time their income also proportionately increases.

The building is three storeys high, and there is a terraced roof at the top, to which the same staircase gives access. All the outer walls are of brick-in-lime, 14 inches thick, and inner ones, thin partitions, $4\frac{1}{2}$ inches thick, of brick in cement mortar. For supporting the beams and floor, four R. C. C. columns are provided in the central longitudinal wall shown by thick portions of the wall.

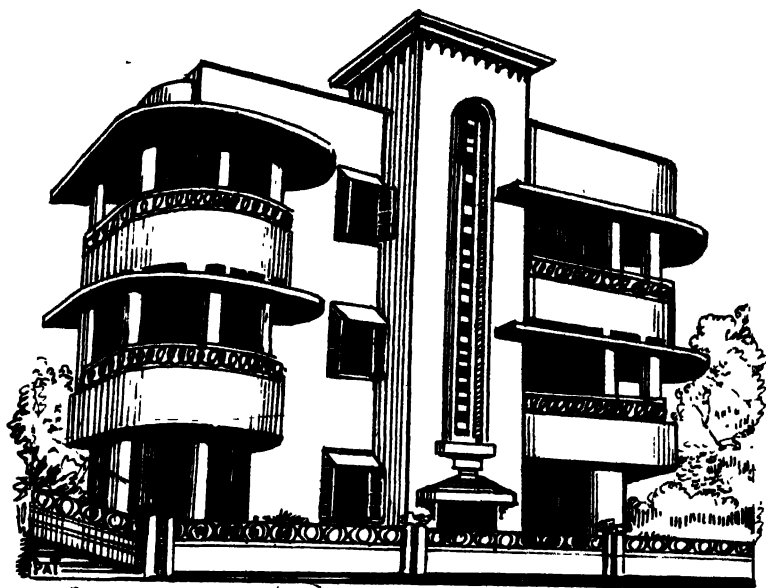
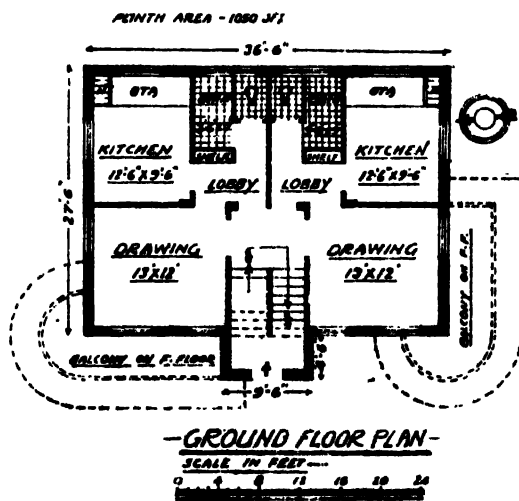


Fig. 232



PLAN NO. 85

PLINTH AREA: 1750 Sq. Ft.

From the very imposing appearance of the exterior, nobody would believe that this is not a palatial building, but it is, in reality, only one having four flats on each floor, each consisting of two rooms. This building is an example of the utmost skill employed by the architects to take the maximum advantage of space in providing conveniences.

The accommodation is practically the same as that provided by the preceding plan, though the drawing hall is a bit larger. There are two entrances, one in the front, giving access to the front flats, and the other on the rear for entering the rear ones. The bath-rooms and w. c. s are arranged round a small open *chowk* or court-yard, open to the sky, so that all the drains are concentrated at one place, which is very economical. Access to the *chowk* for cleaning, is kept through one of the w. c.s on the ground floor. Though the w. c.s and baths are just in front of the entrance, they are provided with self-closing spring doors. Their height again is kept only 6' 6", and lofts for storage are made above them. The *ota* in the kitchen is almost like a table 2' 6" high with asbestos cement-lined top, below which a cupboard is formed. The whole thing is removable, so that in the event, instead of a married couple, students occupy the flat who do not want to cook their food, the same can be used as a table or may be removed altogether. The balconies provided in front of every bed-room are wide enough to afford sufficient room for a bed for sleeping out. There are so many other small gadgets provided by attending to minor details by the architects that the flats have become very popular.

The white square in the midst of outer walls shown in the plan are the R. C. C. columns; similar columns have been built also in the middle, and all these support the entire weight, the walls between them serving merely as partitions. There is a roof terrace at the top, to which the main staircase gives access.

Perhaps the only drawback of the plan is the small central court-yard, which might accumulate rubbish. However, no important rooms abut against it, and further, efficient means of frequent inspection and cleaning are kept in it. Still it would be better if a horizontal pipe of sufficient diameter be provided below the floor level for ventilating it, with its one end open on the street side, and the other, on the *chowk* side,

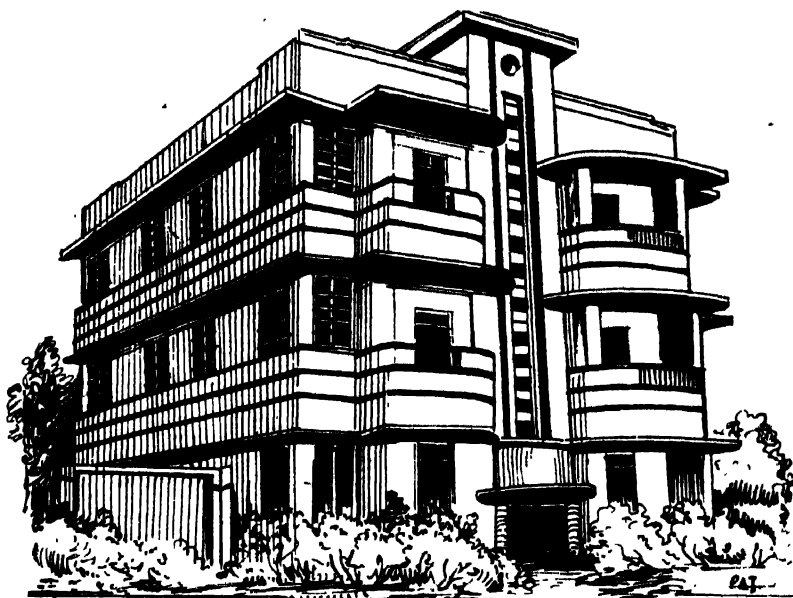


Fig. 234

Architects:
Adalja and Noorani,
Bombay.

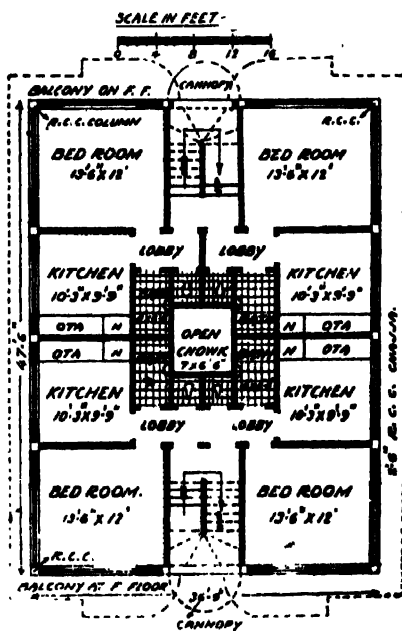


Fig. 235

— GROUND FLOOR PLAN —

AREA OF EACH TENEMENT 365 Sq. Ft.

The building pictured on the opposite page consists of units of 2½ rooms (two rooms and a verandah), suitable for slightly better working class people in industrial area in rural district, where land is comparatively cheap. Any number of units in a row may be built. As every unit is attached to the adjacent one by a common wall, light and ventilation have to be derived from the front and back only.

If the verandahs are partially or wholly closed by a parapet wall, and trellis work above it they will be most useful multi-purpose sort of rooms.

A bath room and w. c. are provided on the back side to be used in common by two units. A large cupboard and a number of shelves are provided. The sizes of rooms are adequate for the class of the building.

A loft over half the area of kitchen to be reached by a ladder would provide storage space.

The chullas are on raised platforms with an independent smoke outlet for each protruding above the roof.

The roof is of flat R. C. C. slab water-proofed on top surface, arranged at different heights, according to the sizes of rooms. It is sure to remain cool in the summer.

The elevation shown in Fig. 237 is beautiful and modern.

* Courtesy: The Concrete Association of India.

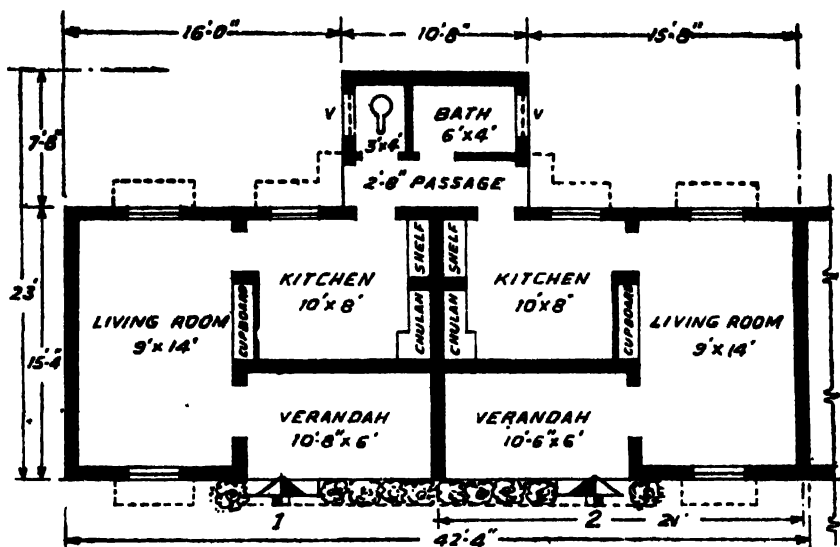


Fig. 236

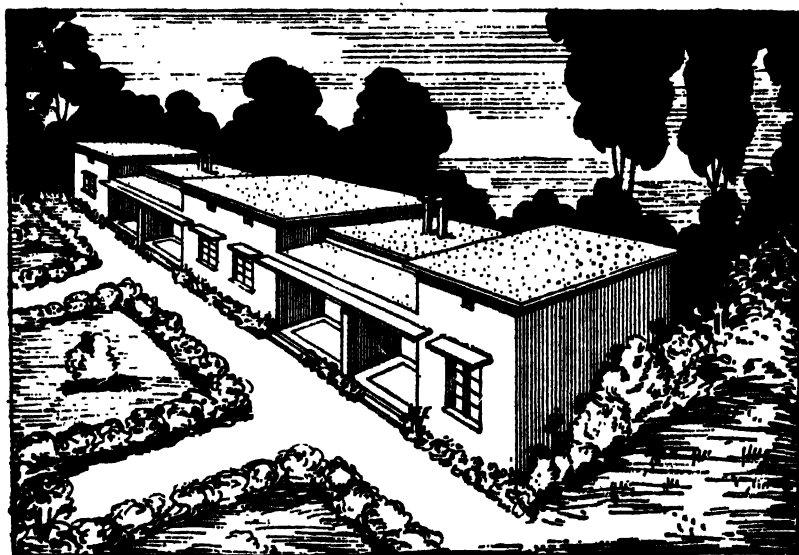
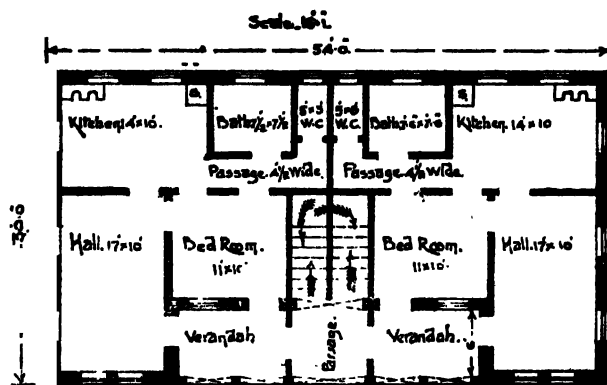


Fig. 237

AREA OF EACH TENEMENT: 810 Sq. Ft.

The plan shown below is an improvement on the previous one. It provides two three-room semi-detached flats on each floor, of a multi-storeyed building, self-contained in every respect. The kitchen is large enough to



Plan of Top and Ground Floors.

PLAN NO. 88

Fig. 238

AREA OF EACH TENEMENT: 678 Sq. Ft.

The plan shown below though occupying less area provides good-sized four rooms. The sanitary unit is most conveniently placed. The positions and sizes of windows are not shown. But they are obvious. There are besides three balconies on upper floors. The staircase is easy to climb, and serves all the floors.

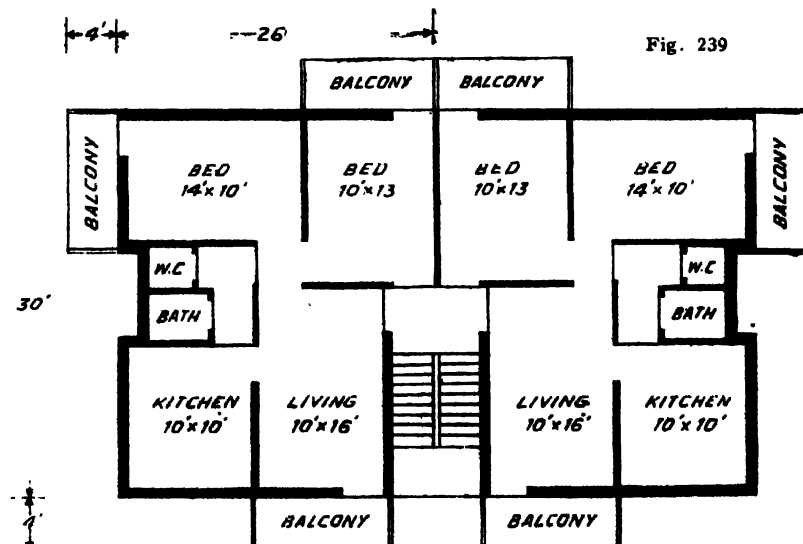


Fig. 239

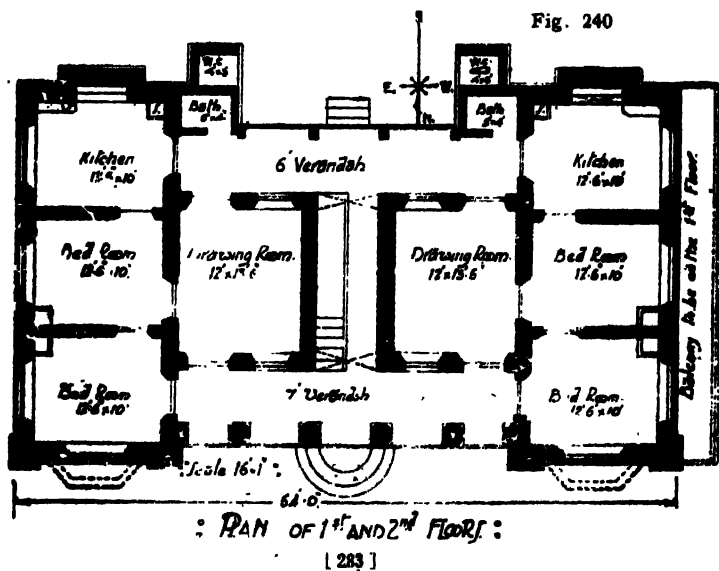
Four-room Flats

PLAN NO. 89

PLINTH AREA OF EACH TENEMENT: 1120 Sq. Ft.

This is a very compact design of flats, in which the minimum accommodation required by a middle-class family, viz., of a kitchen, two bed-rooms, a drawing-room and a verandah, is provided. The drawing-room is quite an independent room, so that even if outsiders occupy it, the privacy of other rooms will not be disturbed. There is a smoke-outlet provided by projecting a part of the kitchen at the back. If light partitions be erected across the front and rear verandahs, in line with the outer lines of the wall of the drawing-room, with self-closing shutters hung by means of springed hinges, the front verandah would become a useful sitting-room and the rear one, a small dining-room for occasional use. There are projecting balconies provided in front of windows on the front side and a cantilever gallery on the west side on the upper floor. The w. c.s are placed just outside the building abutting against the bath-rooms.

The kitchen and both the bed-rooms are all of the same size and their oblong shape makes them very serviceable. Wall cupboards are provided in the space below windows. Thus the flats supply all the needs of a fairly large middle-class family.



PLAN NO. 90

PLINTH AREA OF EACH TENEMENT: 1290 Sq. Ft.

The flats represented below are an improvement upon previous ones. The verandah in front is altogether omitted, and similar economy is made in doing away with the lobby, which has resulted in increasing one room. The sizes of all the rooms are large. There is a separate store-room provided and the bath-room and w. c. are arranged in a separate appurtenance on the rear side, and they can be reached either by the door in the hall, through the passage below staircase, dining-room or kitchen. The latter is rather a small room, but the separate provision of a dining-room and a store-room more than counterbalances it. If a further improvement is desired, a six feet verandah may be provided in front of the main hall. This would increase the size of the bed-room to 18' \times 12'. Though this would cause some increase in the cost it would make the flats at once suitable for a higher class of people who are in a position to pay a higher rent.

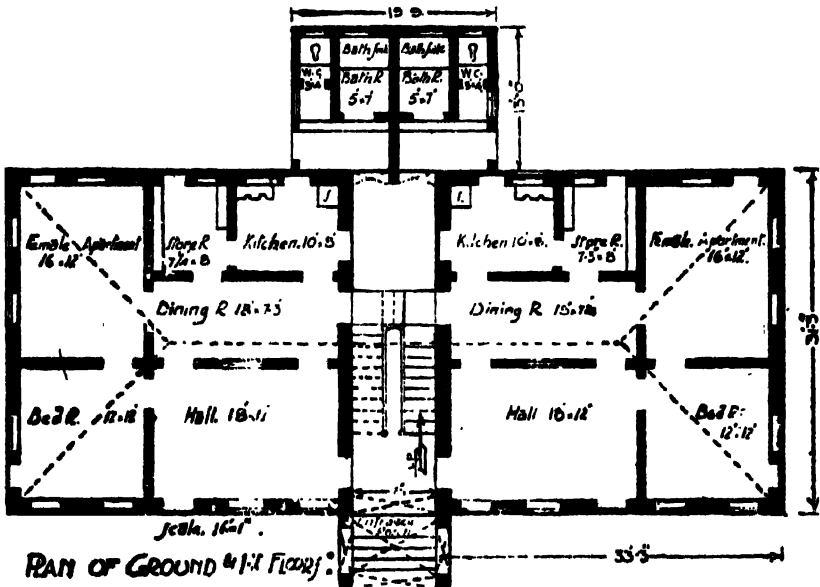
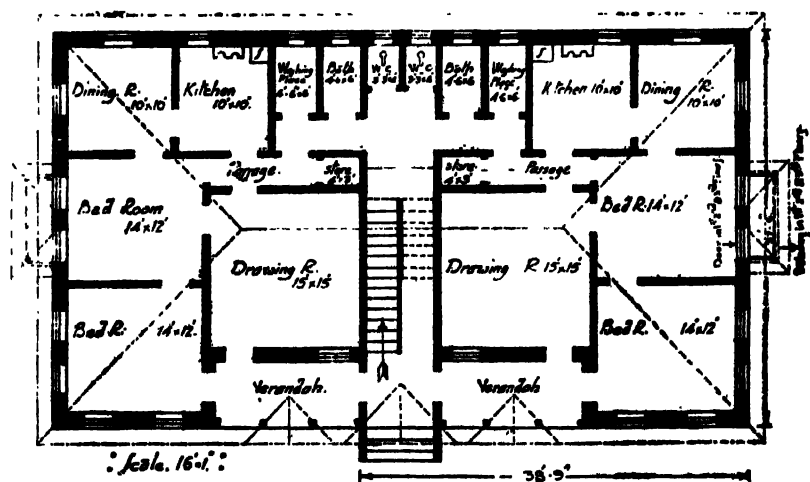


Fig. 241

PLAN NO. 91

PLINTH AREA OF EACH TENEMENT: 1312 Sq. Ft.

The five-and-a-half-room flats represented by the plan below provide accommodation for an upper middle-class family. The sizes of all the rooms are very good. The kitchen, though small, would serve quite well as there are separate rooms for storage and dining, close by. The outer walls are 15 to 18 ins. thick, and all the partition walls are half-brick thick. The weight of the upper floor and roof is taken up by a framework of R. C. C. which is hidden in the partition walls. The staircase is very easy. If another private staircase is required either for servants or for ladies on the upper floor to go down when the front verandah is occupied by visitors, one flight can be provided with its entrance for going down in the passage opposite to the washing-place, which would lead to the middle landing of the main staircase, from where the lower flight of the main staircase can be used for reaching the ground. But this has to be done at the sacrifice of the small store-room. The central position of the staircase, with a slight projection of its bay, would suggest a number of ideas to the architect to make the elevation as attractive as required.



: PLAN OF GROUND, 1st, 2nd AND 3rd FLOORS :

Fig. 242

PLAN NO. 92*

AREA OF EACH TENEMENT: 790 Sq. Ft.

This is a very economical plan of a semi-detached house for two families. It is very cleverly designed, so that within an area of 790 sq. ft. all the accommodation normally required by a family of 4 or 5 members is provided. This has been made possible because there is practically no space wasted in passages, still every room and the bath-w. c. are independently accessible. The living room derives borrowed light through the window in the front verandah and is therefore likely to be slightly dark in the early morning and evening. The small store room with rows of shelves is a special feature. In addition to this it is possible to provide a spacious loft extending not only over the store room, bath, w. c. and passage, but also on half the kitchen. The dining room is very conveniently placed with respect to the kitchen. As there is only one bed room it would also serve as a second bed room. The verandah, which is practically a room, would be more useful than even the living room, for children to study, for receiving guests, and as a sitting room. It would have been better if it were a foot or two wider to accommodate 3 or 4 beds for occasional visitors.

The elevation also is very attractive as shown in Fig. 243.

*Courtesy: The Concrete Association of India.

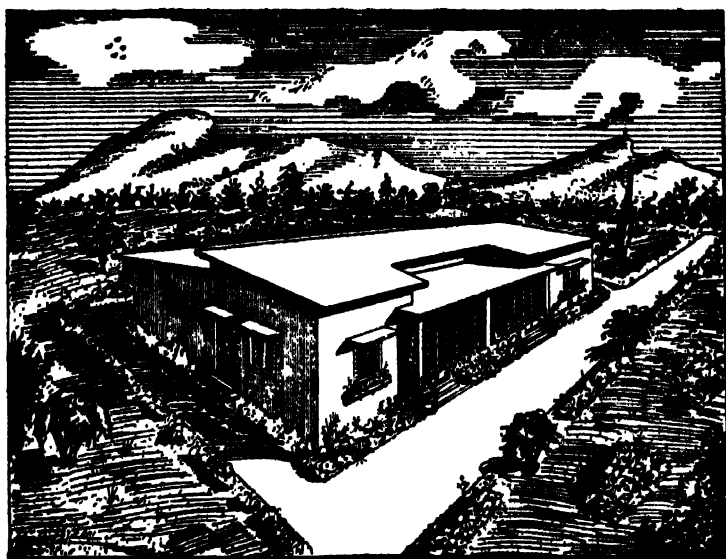


Fig. 243

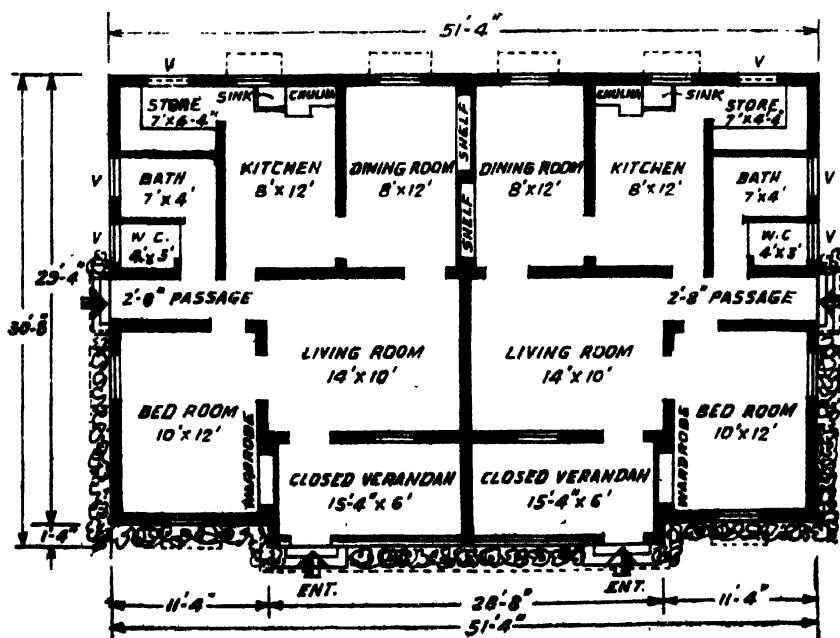


Fig. 244

PLINTH AREA: 1,820 Sq. Ft.

The five-room home pictured on the opposite page fulfils the dream of a well-to-do middle class family of medium size. From Fig. 245 its trim beauty is obvious, but there are other qualities which make you like it the better, the longer you live in it.

The first thing one can easily note is its economic, compact planning. There is not a single inch of space occupied by passages, and yet the privacy, independent accessibility to each room, and free circulation are all amply in evidence. The two floors could be used by the same family, or one of them could be rented out to a different family. For the upper floor a side entrance on the left-hand side is provided to the staircase room. The latter room is separated from the rest of the house by a collapsible steel gate opposite to the drawing-room. If the upper flat is occupied by a different family a cloth curtain should be hung to cover the openings in the collapsible gate for privacy.

There is a verandah in the front, 8 ft. wide and 20 ft. long. The drawing-room behind it is of ample size. The window in the end wall of this room has a projecting concrete flower box at its sill level. The bedroom in the front, besides being well proportioned, is provided with a small dressing-room. The segmental, sweeping, large window in the front and two windows in the side wall supply ample light and ventilation. The dining-room is just of sufficient size, and is conveniently placed near the kitchen. The ladies' room can be converted into another bed-room. The kitchen is spacious enough even to accommodate the school-going children taking their hurried meals, and has a store-room attached to it. The small verandah in front of it would serve as a work verandah for pounding spices, etc. The bath-room and w. c. are both very conveniently located. The grouping of the rooms in general is excellent.

The exterior synchronizes with the conveniences and comforts within. Thus the house provides all the needs of an active and alert middle class family and is sure to prove the joy and pride of the possessor.



Fig. 245

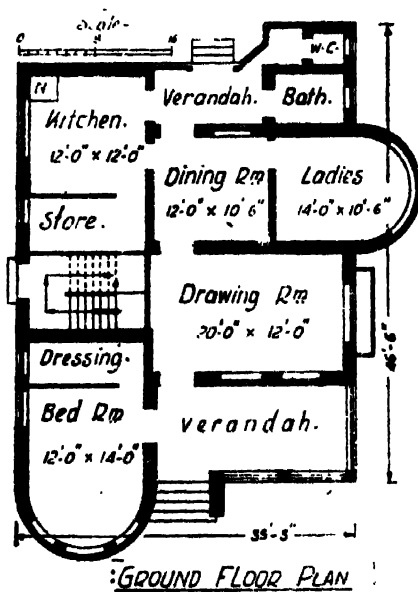


Fig. 246

PLAN NO. 94

PLINTH AREA 1710 Sq. Ft.

This house is designed on flat system, catering to the needs of two decent families, one on each floor.

There is just a small portico at the entrance on the ground floor, which leads either to the spacious drawing hall, or the bed rooms. The drawing hall of 15' X 25' with a projecting bay window is in itself sufficiently large, but when the space of the dining room, which is separated by a screen is added, it becomes very spacious for use on festive occasions. On the right hand is an easy staircase in two flights in a lobby so that if both the floors are to be occupied by the same family, it would be accessible from any room of the house. If on the other hand, the upper floor is to be used by a different family, a collapsible steel door with a cloth screen for privacy, would make the staircase independent of the ground floor.

Behind the staircase there are two bed rooms of good size with windows on the west. The 7-ft. verandah on the rear adds to the convenience. The sanitary services consisting of a large bath room, a w. c. and washing place are independently accessible from any room. The kitchen with modern conveniences is of sufficient size, close to the dining room.

The same staircase is continued to the terrace on top of the upper floor. Only two floors are shown in the elevation, but it is possible to repeat the same accommodation for any number of floors.

The elevation is modern and most attractive. The surfaces are smooth and reliance for beauty is made on bold lines, mass effect, and fenestration. The effect has been marvellous as will be seen from the way it soothes the eye.

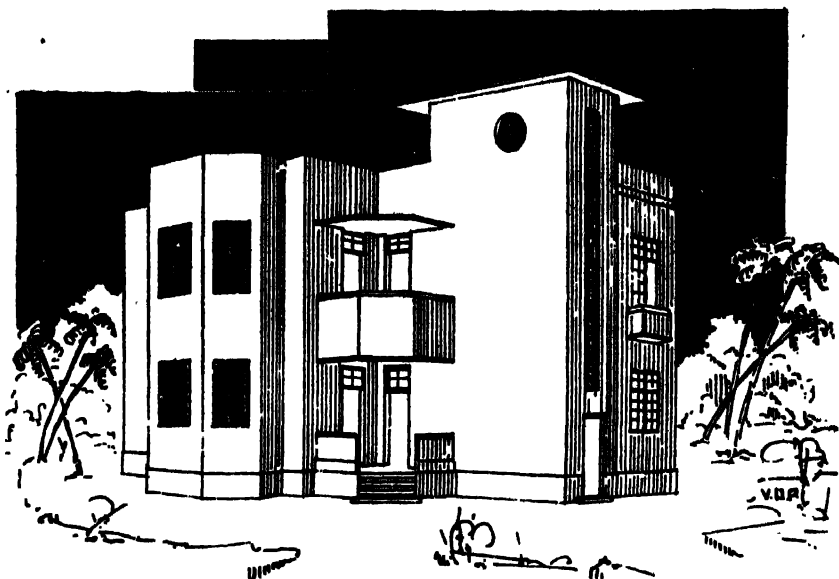


Fig. 247

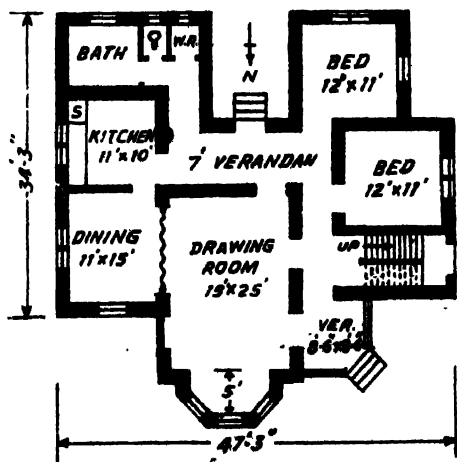


Fig. 248

Ground and First Floor Plan.

PLAN NO. 95

PLINTH AREA: 1535 Sq. Ft.

The plan on the opposite page represents a very convenient design of flats *de luxe*. It comprises all the necessary elements that go to make a successful design. There is a spacious verandah of 8 ft. width in the front, which, if a screen be arranged across it on the left-hand side of the entrance steps to close the view of the staircase, would obtain a perfect privacy from people of the upper flats going up and down the staircase. The kitchen occupies the best position in respect of the proper orientation and, being an oblong room though small, would be very serviceable. The store-room is quite conveniently situated with respect to the kitchen. The drawing-room is quite an independent room and, as such, even when it is occupied by strangers, the privacy of the entire house will remain undisturbed. The dining-room is also a large, oblong room and quite close to the kitchen. There is a general bath-room with an independent passage to it from any room in the house. The bed-rooms are situated at the extreme sides of the flats and, as they face the west, they enjoy breeze to the maximum extent. The bed-room on the south side has its own private bath-room and as the general bath-room is quite close to the other bed-room, it will serve as its private bath-room. There is a convenient entrance at the back. Thus, considered from every point of view, it is a flat enjoying practically all the benefits of a cottage home.

As the staircase is on the outside in one corner, the upper flats enjoy still better privacy, because, if the door between the staircase and the verandah is kept closed, the privacy of the flats would in no way be disturbed by the people using the staircase, provided the latter is of sound-proof material.

The elevation is most delightful and, if an adequate setting of a landscape garden be provided, its charms would be still more heightened. The staircase bay projects too much beyond other parts and, therefore, catches the eye first, but this feature is relieved by the small corner balconies. The tall windows on either side lend a balancing effect.

Perhaps the only defect of the building is that there are too many corners which must necessarily increase the cost.

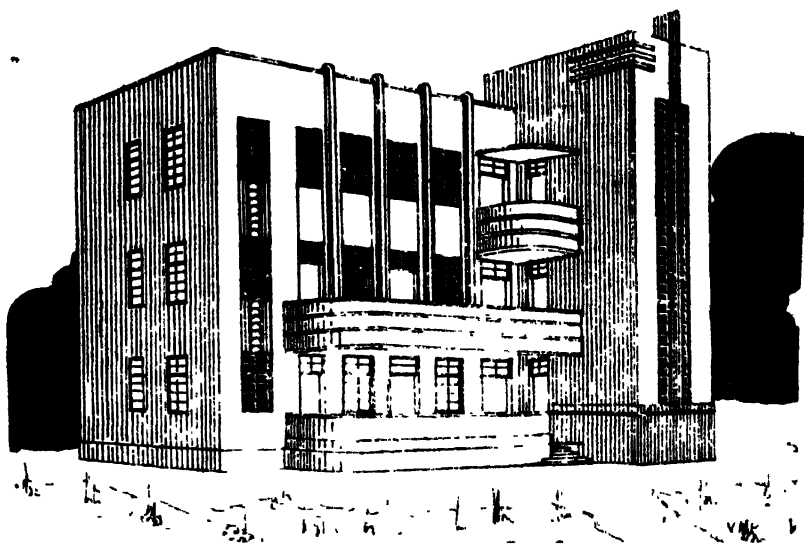


Fig. 249

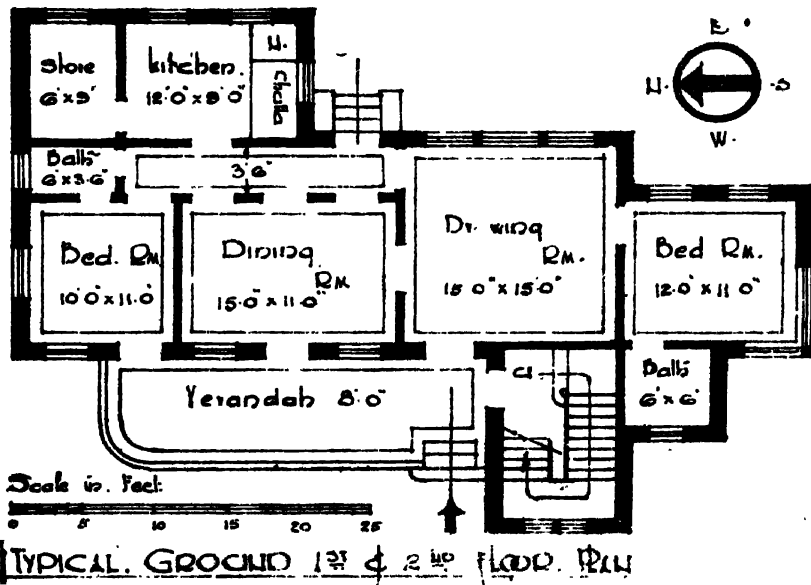


Fig. 250

PLAN NO. 96

PLINTH AREA: 2010 Sq. Ft.

The plan of these flats is on a more luxurious scale than the preceding design. Not only is every room larger and more spacious, but the general arrangement also is more convenient and, therefore, calculated to make for greater comfort and happiness. The verandah in front is ten feet wide and its extension on the extreme left, in particular, makes it very enjoyable. The staircase, as in the previous plan, is outside the building and on its extreme right-hand corner, so that the people going up and down it would cause no disturbance to the people occupying the lower flat.

The drawing-room is next to the staircase, the most projecting room. It is a much larger room than in the previous plan, and can, besides, be combined with the dining-room on special occasions. The dining-room is better situated with respect to the kitchen and has just the necessary size. The kitchen occupies the corner, viz., north-east and has a store-room connected to it in a convenient manner. There are two spacious bed-rooms, each with a private bath attached to it. The one on the left-hand side would be a very suitable guest-room, as it has a separate entrance from the outside and is completely closed on the kitchen side. The other bed-room, viz., that on the extreme right-hand side, is a very charming room as it commands a wide outlook both in the south and west directions. It would be a very appropriate room for the master. The semi-circular verandah on the rear might serve either as a work verandah or a sitting-out place in the evening. There is no general bath-room. For this it is suggested that the bath-room attached to the master's room might be provided with a door in the lobby and kept open for general use by day, when its door on the bed-room side may be kept closed, or, better still, another bath-room may be made in the passage between the dining-room and the bath-room attached to the master's bed-room by putting just one cross partition across the passage.

The circular staircase, with its three-fold window, lends exquisite beauty to the already charming general composition. Though all the steps are winding, they are sufficiently broad, even at the inner end, as the central "well" is large. The same staircase winds to the terraced roof, and the latter can be used as a deck. Architecturally, this is one of the most beautiful residential buildings. Thus considered from every point of view, the home leaves nothing to be desired.

INDEX

- Accessories of landscape garden, 81
- Adding upper floor, 13
- Advantages of a square plan, 9
 - of rocky site, 16
- Aesthetic staircase, 60
- Afternoon tea, space for, 33
- Air-bricks, 47
- Air-conditioning, 107
- Air-cooling, 111
- Air requirements of nursery, 62
- Air-washing, 113
- Allocation of space, 33
- Allowance of air for furniture, 43
- Alterations in plan, 13
- Amenities of a nursery, 62
- Analysis of a home, 33
- Angle of vision, 75
- Ante-room to comfort room, 61
- Apertures in a home, 37
- Arbour, 75, 81
- Architect's service, 9
- Architecture, modern, 13, 66
 - change in, with times, 68
- Artificial lighting, 116
- Aspect, 22
- Attic as a store-room, 53
- Avoidance of shadows, 116

- Bakelite, 67
- Balance in mass, 72
 - in garden, 76
- Balcony, 39
- Bambo matting for insulation, 106
- Basement, 53
- Bath-room, 37, 56
 - in bed-room, 43
- Bay windows, 24, 26
- Bed-room, condition of, in Indian
 - homes of the poor, 42
 - furniture in, 98
 - orientation of, 20, 43
 - windows in, 43
- Behren, 66
- Bicycles storage, 53, 54
- Bird-rest, 81
- Breeze, 18
- Broken colours, 84
- Building for Investment, 15
- Built-in wall cupboard, 46, 54
- Bulky storage, 53
- Busy street not good for home, 19

- Cabinets in kitchen, 47
 - in store, 53
- Candle-power, 117
- Cantilever canopy, 67
- Carbonic acid gas, 42
- Causes of exodus from villages, 2
 - of low vitality, 44
- Ceiling height, 11
- Cellar as store, 53
- Central system of air-cooling, 109
- Cesspool, 17
- Chair, armless, in kitchen, 48
- Chawl*, 264
- Cheerful surroundings, 63, 74, 82
- Chesterfield chair, 51
- Chest of drawers, 44
- Child-play, 34, 30
- Children's room, 61
- Chowk*, 278
- Chromium, 67
- Chulla* range, 47
- Circulation, 31
- Clayey site, 16
- Cleanliness, 26
- Clock, 48
- Closet, 34, 43, 55
- Coastal sites, 16
- Coat-hanger, 55
- Colour, psychological effect of, 83
 - cold and warm, colours 91
 - depends upon light, 92
 - effect on radiation, 102
 - in Nature, 87
 - recommendation of, in different rooms, 95
 - schemes, 91, 83
 - schemes based on harmony, 87
 - schemes in ancient India, 93
- Colorcrete, 67
- Colour chart, 86
- Coloured birds in tropics, 91
- Coloured pictures in nursery, 62
- Comfort, 3
 - room, 60
- Concentration of mind, 35, 56
- Concrete flower-boxes, 43
- Concrete *jali*, 67
- Conservatory, 100
- Contrasting colours, 90
- Cooking range, 47
- Cooling by ice, 113
 - by night air, 113
 - effect of trees, 16, 78
- Co-operative movement, 3
- Copying Nature, 68
- Corbusier Le, 66

- Corners in plan, too many, 14
- Corner shelf, 54
- Cornice 42
- Cost depends on shape 9
 - depends on local materials, 12
 - depends on season of work, 13
 - of homes, 121
 - of labour, 7
 - of materials, 7
- Cross ventilation, 43
- Cupboards, 34, 44
 - built-in walls, 54
 - underground, 51, 54
- Dado in drawing-room, 41, 92'
 - in nursery, 62
- Damp, 57
- Decoration, 83
 - of new house, 92
- Dead storage, 54
- Defective drain, 17
- Devices for automatic opening of garage, 65
- Dining, 33, 48
 - room, furniture in, 98
 - in open air, 33
 - table, 49, 98
- Direct lighting, 117
- Direction of wind, 20, 43
- Discomfort, causes of, 18
- Discord in colour, 84, 88
 - effect of, 89
- Disposal of solid and liquid refuse, 27
- Distance of building from street, 75
- Division of labour, 12
- Doors in drawing-room, 40
 - in kitchen, 46
- Double drawing-room, 40
- Drainage facilities of site, 15
- Drain-boards, 47
- Drawing-room, 39
 - size, 40
- Dressing-room, 44
 - furniture, 98
- Drying court, 38, 77
- Drying line, 77
 - linen, 36
 - yard, 77
- Dudock, 66
- Dust, 17, 108
- Earth closet, 27
- Economy, 5, 9, 122
 - Effect of colour on mind, 83, 84
 - of discord, 84, 88
- Electric light, 116, 119
 - lighting, economy in, 119
- Elimination of glare, 117
- Embellishment, 4
- Enclosed area looks small, 77
- Entrance, 36
 - verandah furniture, 98
- Environment moulds character, 74, 100
- Equipment of kitchen, 46
 - bath, 57
 - dining-room, 48
 - nursery, 62
- Esprit Moderne*, 68
- Estimate of home, necessary, 2
- Evaporation from body surface, 16, 107
- Fabric, 99
- Facing of buildings, 18
- Factors affecting economy, 4
- Fencing, 82
- Ferro-concrete, 67
- Festive occasions, 36
- Filtering air, 109
- Fire-proof garage, 65
 - staircase, 59
- Flat roof, 7, 122
- Flats 273
- Flexible wires, 118
- Flexibility in a home, 5, 23, 30
- Flies, nuisance of, 49
- Floor in kitchen, 48
- Flower-beds, 80
- Folding partition, 49
- Foot-candle, 116
- Fountain, 81
- Frank Lloyd Wright, 66
- Freehold site, 17
- Front yard, treatment of, 75
- Fuel room, 54
- Functionalism, 67
- Furnishing, 96
- Furniture in nursery, 62
- Furniture requirements, 25, 27
 - in different rooms, 96, 98
 - in modern architecture, 69
- Gangway for serving food, 46
- Garage, 66, 76
 - inside home, 65, 76
 - placement of 76
- Garbage bin, 47
- Gas cooking and plants, 100
- Geometrical staircase, 59
- Glare, to avoid, 41
- Glass in building and furniture, 67, 95
- Good planning, 3
- Grass matting for insulation, 106
- Gravelly site, 16
- Grille, W.I., 67
- Gropius, 4, 66
- Grouping of rooms, 25, 27, 37
- Guest-room, 61
- Harmony in colour, 84, 86, 94
 - in architecture, 72
- Hatstand, 55
- Hedge, 78, 82
- Hedgerow, 82
- Height of floor, 11, 93
 - of walls, apparent increase in, 93
- High plinth, 11
- Hobbies, 35

Home in centre of plot, 75
 Honesty in architecture, 71
 Horizontal angle of vision, 75
 House should be growing, 32
 Hue, 84
 Humidification, 108, 111
 Humidity, 21, 29, 107
 Humus, 27

Ideal homes, 121
 Importance of bed-room, 42
 —of plan and estimate, 2
 —of sunshine, 20
 Improvement of orthodox kitchen, 45
 Indirect lighting, 117
 Ingle nook, 14
 Inflation of rent, 3
 Insulation from heat, 102
 —from sound, 114
 Insurance, 3
 Interior decoration, 83
 Introduction, 1
 Investment, 17

Jali, 29, 67

Junctions of wall with floor, 27

Kiln, 17

Kitchen, 44

—equipment of, 47

—size of, 46

—smells in, 47

Kitchen furniture, 98

Labour saving, 68

Ladies' apartment, 51

Landscape garden, 74

Larder, 34

Lavatory basin, 64

Lawn, 77

Le Corbusier, 66

Library furniture, 98

Life Insurance Corporation, 3

Light importance of, 19, 91, 116

—in colour schemes, 91

Lighting standard, 119

Living room, 39

Lobby, 5

Local materials, 13

Loft for store, 54

—above bath-room, 56

—on garage, 54, 65

Low building, remedy for, 71

Lumber room, 35

Lying-in room, 52

Main entrance, position of, 39, 75

Maintenance cost, 75

Master's bed-room, 44

Meals, hurried, of children, 30

Minimum size of drawing-room, 40

Mirror-type insulation, 103

Modern architecture, 2, 66

—kitchen, in the West, 44

—trend in colour, 88

—trend in landscaping, 74

Morning sun, 20

Morning tea, 33

Motif, 78

Mouldings to be avoided, 27

Movement of air, 209

Multi use of space, 51

Multi-purpose table, 51

Music, 35

Needlework, 35

Neighbourhood, 17

New materials, 67

News reading, 35

Nhani trap, 57, 64

North light, 92

North light is cold, 92

Nuisance of flies, 17

Nursery, 61

Oblong kitchens, better, 45

Oil lamps, disadvantage of, 117

Orient blue, 92

Orientation, 18

—aim of, 19

—bed-room, 41

—of kitchen, 45

Oud, 66

Out-door living room, 41

Outer thick wall, 11

Oven, 47

Ownership flats, 4

Pantry, 34, 54

Parties, 36, 49

Partition, 4, 50

—folding, 23, 50

Passage, width of, 5, 38

—lighting, 119

Pega, 41

Pergola, 81

Perspiration, causes of, 107

Physical features of site, 16

Picture rail, 41

Pise de terre, 105

Placing of doors, 40

—of garage, 76

Plantation about building, 78

Plants in room, 99

—selection of, 78

Play-room for children, 62

Plinth area rate, 7

—height of, 11

Plywood closets, 55

Polished paving in bath, 57

Pool, in garden, 81

Position of store, 52

—of kitchen, 45

—of staircase, 60

Practical conveniences, 15

—considerations, 23, 32

- hints on lighting, 118
- Prayer-room, 56
- Preparation table, 47
- Prevention of flies, 47
- Primary colours, 85
- Privacy, 22, 75
 - of bath, 23
 - of sound, 23, 114
- Proportion, 71
- Prospect, 23, 24
- Provision store, 35
- Psychological effect of colour, 83
- of plants, 100
- Purdah*, 41
- Purpose of landscaping, 74

- Radiation of heat, 21, 102
- Radio City, 114
- Radio, listening to, 35
 - space for, 98
- Railway, proximity to, 17
- R. C. C. construction, 67
- Reception room, 39
 - furniture in, 98
- Reclaimed ground, 16
- Recreation, 36
- Reducing height of floors, 11
- Reflector, requirements of, 118
- Refrigerant, 113
- Refugees, 2
- Refrigerator, 48
- Relaxation, 33
- Rent Act, 3
- Requirements of good planning, 3
 - of comfort room, 60
 - of good site, 17
 - of guest room, 61
 - of nursery, 62
- Rise in cost, 2, 121
- Rise and tread, relation of, 59
- Rockefeller centre, 114
- Rocky site, 17
- Road, 85
- Roof terrace, 77
- Roominess, 25, 28
- Rough cost, 8
- Rules of design of bed-room, 43
- Sandy surface, 16
- Sanitary considerations of site, 16
- Sanitary fittings, 64
- Sanitation, 21, 25
- Sarac catching fire, remedy for, 45
- School near home site, 17
- Scullery, 46
- Sea-breeze, 21
- Season of building work, 12
- Seat in garden, 81
- Seclusion, 23
 - in prayer-room, 56
- Selection of site, 15
- Semi-indirect lighting, 117
- Septic tank, 65
- Setting off building, 74

- Shade of trees, 97
 - of colour, 84
- Shadows, 116
- Shady trees, 82
- Shams in architecture, 71
- Shelves in kitchen, 47
 - in store, 54
- Shrubbery, 41, 78, 79
- Sick-room, 60
- Sink in kitchen, 47
 - in bath, 57
- Site on reclaimed ground, 17
- Skirting, 41
- Sleeping, space for, 34
- Smoke, effect of, on plants, 100
- Smoke outlet, 47
 - in bath, 57
- Soft murum foundations, 16
- Soil conditions of site, 16
- Sound-proofing, 114
- Specification of ideal home, 120
- Speculative builders, 15
- Staircase, 58
 - fire-proof, 59, 60
 - requirements of, 59
- Stainless steel, 67
- Standardisation reduces costs, 12
- Statues, in garden, 81
- Steadiness of light, 116
- Stock sizes, 14
- Storage, 34
 - space in bed-rooms 46
- Store-room, 52
- Storeyed house cheaper, 10
- Storing bicycles 52
- String course, 66
- Study, 34
- Stuffiness, 29
- Sub-soil water, 17
- Suggestions for economy, 9
- Sultriness 107
- Summer air-conditioning, 109
- Summer-house, 81
- Sun-dial, 81
- Sun's rays, 19
- Supply of drinking water, 17
- Symmetry in architecture, 68, 72
- Synthesis of a home, 37

- Table, dining, 98
- Tall building, remedy for, 84
- Tall trees 17
- Tanneries, 17
- Temperature affects comfort, 38, 107
- Terrace, 77
- Through ventilation, 13, 29
- Tint, 84
- Tobacconing, 35
- Toilet-room, 65
- Traffic path in rooms, 40
- Trays of wire for vegetables, 56
- Tree for shade 16, 78

- Trellis work, 29
- Truth in architecture, 71
- Unbroken wall surface, 5
- Underground cupboard, 52, 54
- Underdeveloped localities, 15
- Uneven settlement of foundations, 17
- Unit system of air-conditioning, 112
- Urinal, 36
- Urine, reaction of, on lime, 65
- Uses of dining-room, 50
- Utility, 66
- Vegetable garden, 81
- Ventilation, through, 13, 29
- Verandah on S. W., 22, 38
- width of, 39
- Vertical angle of vision, 75
- Victor Bourgeois, 231
- Visual height, 40
- Vitamins in fresh vegetables, 82
- Walks and drives, 78, 80
- Wall construction in Western countries, 103
- Wall cupboards below windows, 52
- in kitchen, 46
- Wardrobes, 43
- Water closet, 65
- inside bath-room, 58
- Watt, 118
- Western countries and kitchen, 45
- White-washing, for insulation, 106
- Window area, minimum, 43
- sills as flower boxes, 62
- Windows in kitchen, 47
- air-conditioned rooms, 108
- in nursery, 62
- in staircase, 60
- Worship-room, 56
- Wright, Frank Lloyd, 66

